

# Maine Recycles Week 2002

## Curriculum Packet

### Why Teach Waste Management?

Garbage, and the way that we choose to manage it, is an environmental issue that has been getting more and more attention. As Americans, we generate more trash than any other country in the world. Trash is a highly visible issue and one that every student can relate to because EVERYONE generates trash.

Teaching waste management in the classroom is a great way to introduce students to environmental issues in general and to the concept that our actions and our lifestyles have consequences.

### About This Packet

On the following page, you will find a chart listing the activities included in this packet. The chart breaks the activities down by grade level as well as subject matter. It is important to remember that many of these activities may be altered or enhanced to fit other grade levels and to cross into other subjects, but the Maine Learning Results (MLR) Alignments were created according to the grade levels listed in the chart. Each MLR Alignment Summary will follow the activity to which it corresponds.

*Although we believe that you will find the MLR Alignment analyses helpful as you incorporate these activities into your curriculum, please allow for additional alignments that may have been overlooked and instances where you may not agree with our analysis. If you have feedback regarding any part of this packet, please contact Shannon Haines at 207-287-8053.*

### For More Activities

The educational activities in this packet have been borrowed with permission from The Chewonki Foundation's *Pathways to a Sustainable Future: A Curriculum Guide for Maine Schools Exploring Waste Management Issues* and EPA's *Let's Reduce and Recycle: Curriculum for Solid Waste Awareness*. If you would like to obtain a free copy of the complete *Pathways* curriculum, please contact The Chewonki Foundation at 207-882-7323. To obtain a free copy of *Let's Reduce and Recycle* (Publication #: EPA/530-SW-90-005), contact EPA at 1-800-424-9346 or visit their web site at [www.epa.gov/epaoswer/osw/teacher.htm](http://www.epa.gov/epaoswer/osw/teacher.htm).

We have also included an activity, called "The E-Project," that was submitted to us by a teacher whose class participated in the first Maine Recycles Week in 1999. As a result, you will notice that the formatting of the activity as well as the MLR Alignment varies from the others in this packet.

## Waste Management & Recycling Related Activities Breakdown by Grade Level & Subject

ACTIVITY	Pg. #	Grade Level	Lang. Arts	Math	Music	Science	Social Studies	Art
Birds of Zazurds	3	K-2, 3-4, 5-8	XX			XX		
Birds of Zazurds Play	24	5-8, 9-12	XX					XX
Zazurds II	26	5-8, 9-12	XX					
Bread & Kisses	28	5-8				XX	XX	
Drop in the Bucket	31	K-2, 3-4, 5-8		XX				
For Better or Worse	34	3-4, 5-8, 9-12				XX	X	
If Toys Could Talk	37	K-2, 3-4					XX	
Mounting Milk Cartons	40	K-2		XX				XX
Trash-to-Art Festival	43	K-2, 3-4, 5-8, 9-12						XX
EPA Activity 11	46	5-8				XX		
EPA Activity 13	49	K-2, 3-4		XX				
EPA Activity 15	52	K-2, 3-4					XX	
EPA Activity 22	61	3-4				XX		
EPA Activity 26	64	5-8	XX			XX		
EPA Activity 32	68	5-8, 9-12	XX				XX	
EPA Activity 33	73	5-8, 9-12					XX	
The E Project*	75	5-8	XX	XX		XX	XX	XX

*\* Although the E Project is interdisciplinary, its enclosed MLR analysis covers Science correlations only. The format also differs from other alignments in the packet as it was created by the teacher who submitted it.*

**Level**

- **Beginning**
- **Intermediate**
- ◆ **Advanced**

# ***The Birds of Zazurds***

## ***A Story About Waste and Action***

**by Andy Barker**

**illustrated by Josephine Ewing**

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The Birds of Zazurds introduces students to some of the basic waste issues of our time. Written in the spirit of Dr. Seuss, the story takes the Zazurds Backwards Flutter Birds from their idyllic origins in the Gulligutt tree, to their environmental crisis, the big crack. Students suggest solutions as the new generation of Birds comes to grips with their problem. Follow-up activities help the students relate the Birds' experience to their own school and community. The Birds of Zazurds Play gives intermediate students the chance to share the story with younger classes.

This story can raise many additional environmental issues for students. The discussion questions do not address the obvious population problems created by the Birds. Teachers are encouraged to explore topics of interest with students even if they are peripheral to the topic of solid waste.

### ***Overview***

*The story is a good beginning for most classes to look at waste issues in general and see what problems they have around them. Reading the story will motivate students to ask "What about us?" The discussions and activities will get them to start thinking "What can we do?"*

### **Discussion Questions – page 21**

#### ***Follow-up Activities***

##### **Our School the Gulligutt Tree ●**

**Overview:** This is a project where students make drawings to compare the Gulligutt tree and their school. The drawings show how the Birds of Zazurds and people dispose of their waste.

##### **The Birds of Zazurds Play ■**

**Overview:** Students dramatize the Birds of Zazurds and put on a play for younger classes.

##### **Zazurds II ◆**

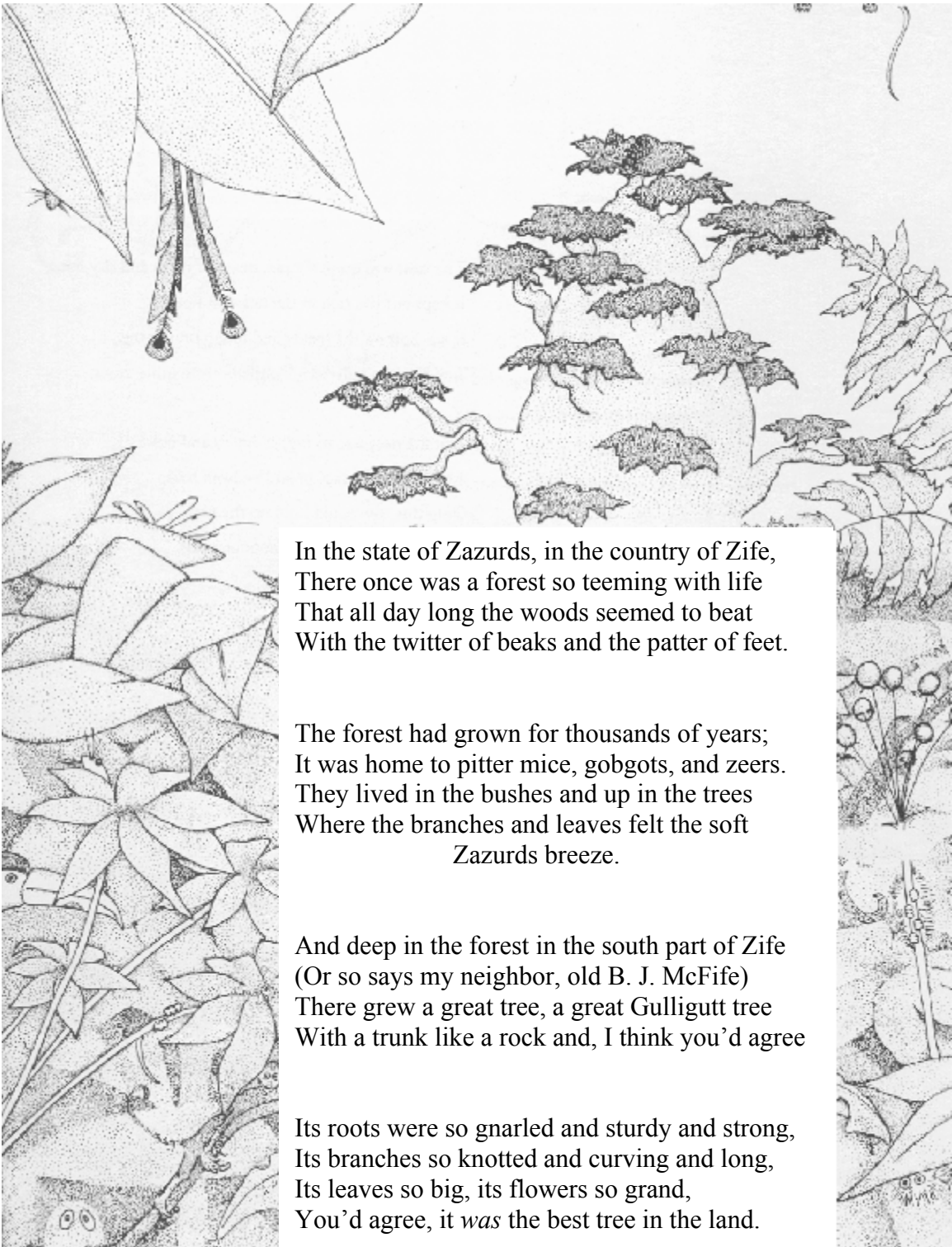
**Overview:** Students write and illustrate a sequel to the story "Birds of Zazurds."

#### **Time Planning**

The story takes about 30 minutes to read, including the two breaks for discussion. This may vary according to the age group. Some teachers of young students prefer to break in the middle of the story, then complete the reading and discussion later.

The final discussion takes about 10 minutes.

Plan a separate period(s) for the follow-up activities.



In the state of Zazurds, in the country of Zife,  
There once was a forest so teeming with life  
That all day long the woods seemed to beat  
With the twitter of beaks and the patter of feet.

The forest had grown for thousands of years;  
It was home to pitter mice, gobgots, and zeers.  
They lived in the bushes and up in the trees  
Where the branches and leaves felt the soft  
Zazurds breeze.

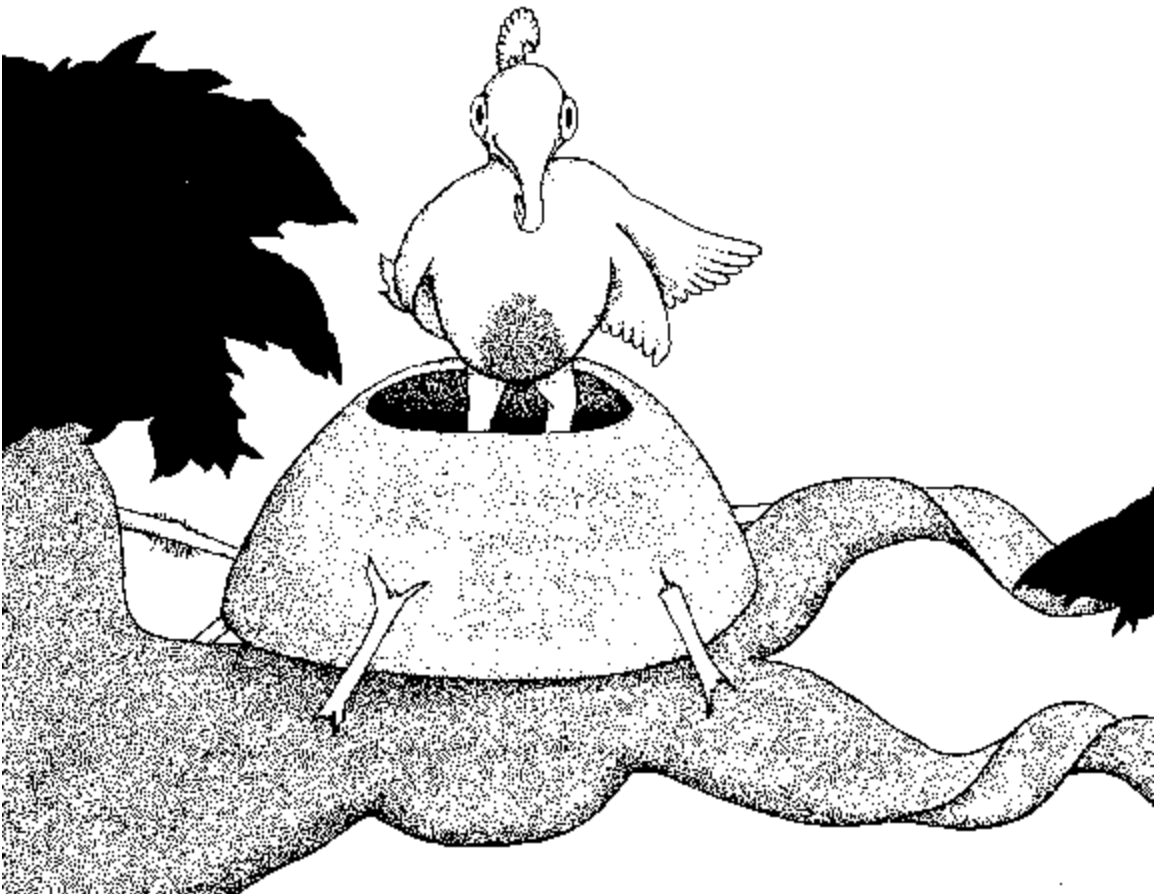
And deep in the forest in the south part of Zife  
(Or so says my neighbor, old B. J. McFife)  
There grew a great tree, a great Gulligutt tree  
With a trunk like a rock and, I think you'd agree

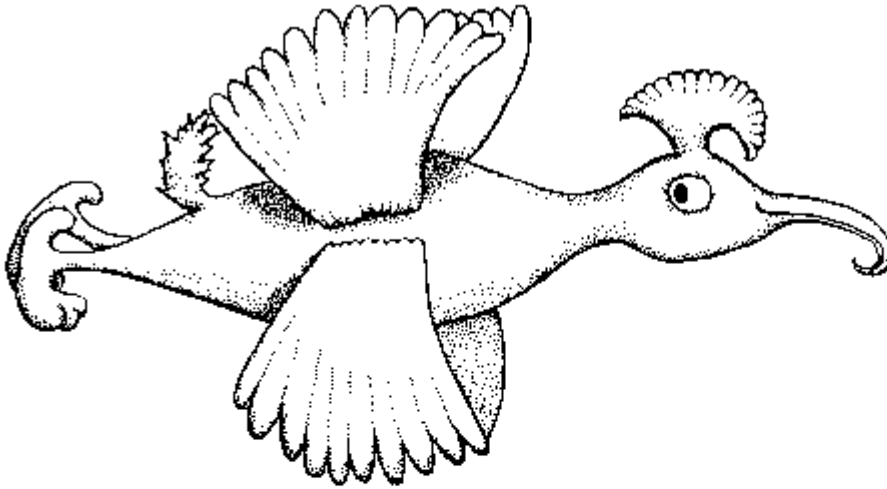
Its roots were so gnarled and sturdy and strong,  
Its branches so knotted and curving and long,  
Its leaves so big, its flowers so grand,  
You'd agree, it *was* the best tree in the land.

And way up in the tip-tippy-top  
Of that Gulligutt tree, something was propped.  
It was a nest! Like no other nest  
One hundred miles east or one hundred miles west!

The nest was quite simple, made of twigs and dry mud;  
It kept out the rain in the heaviest flood;  
It was soft on the inside and tough on the out;  
The top was quite skinny, the bottom quite stout.

And the nest was so big, so heavy and bold,  
That only this tree, or so I've been told,  
Only this tree could hold up the nest  
All day and all night, without any rest.

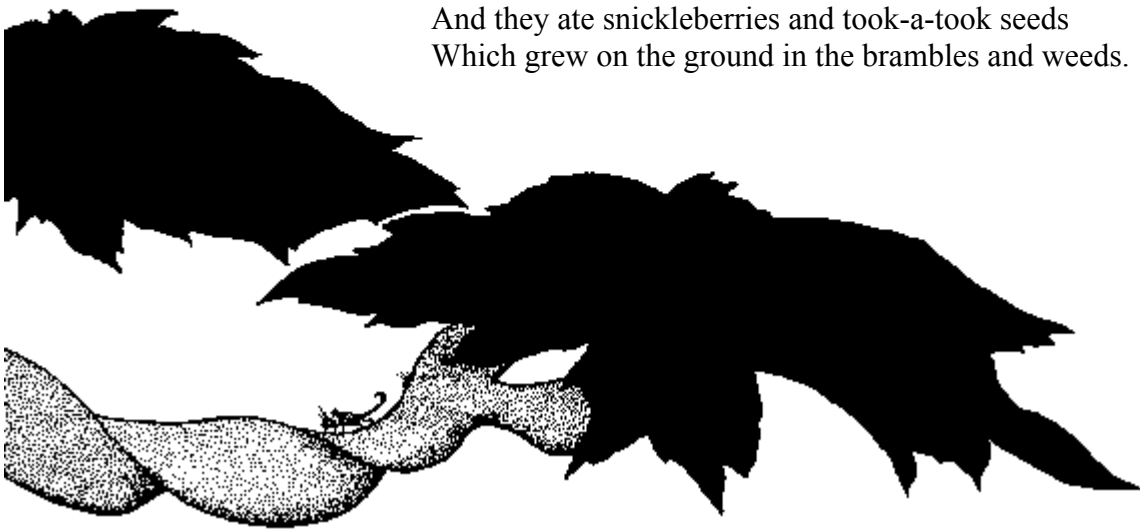


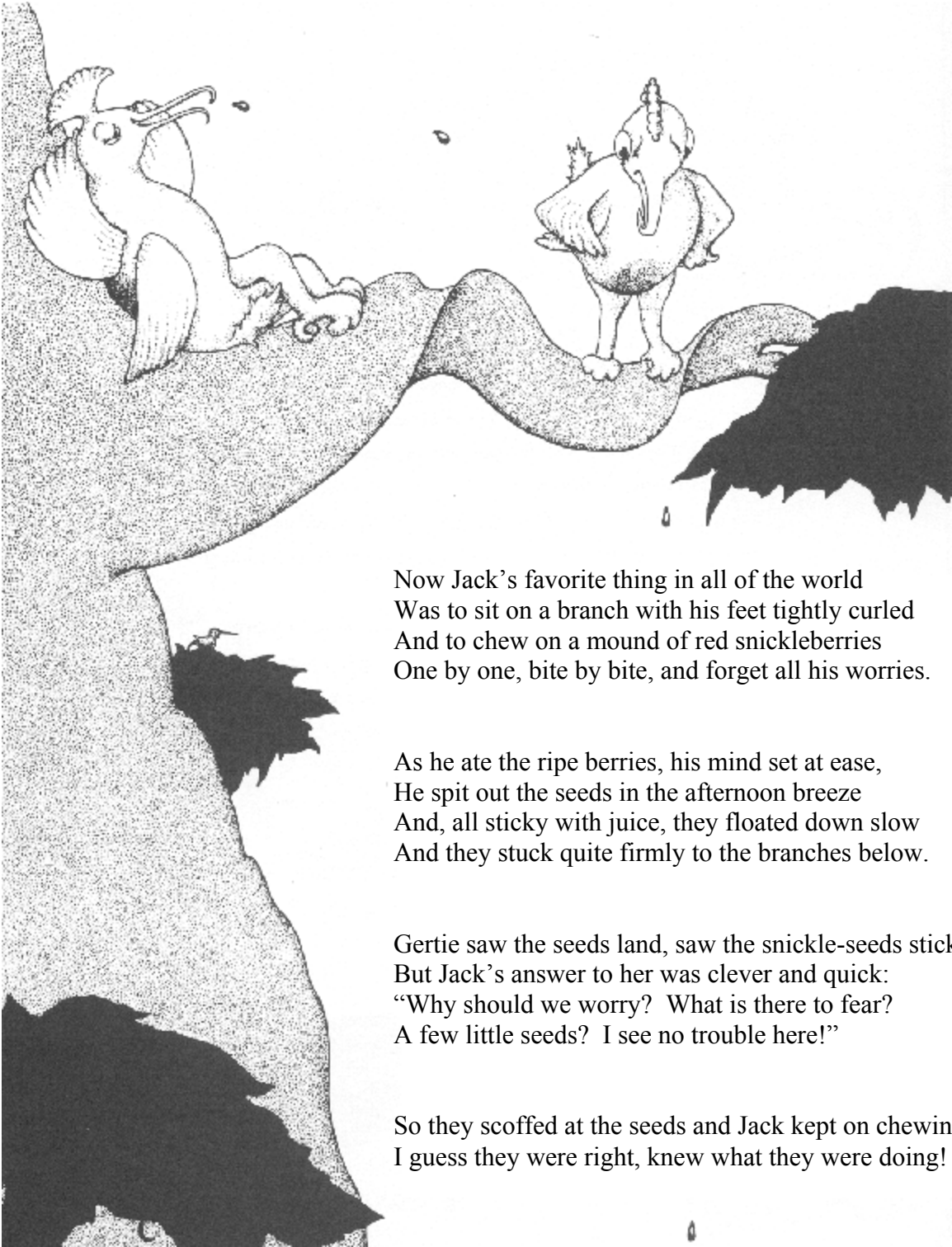


It belonged to two birds so rare in that land  
You could count on the fingers of only one hand  
And still count them all, in the whole land of Zife,  
In the whole living world (or so says McFife).  
And though it sounds odd, though it's downright absurd,  
They were called the Zazurds Backwards Flutter Birds!

They flew on four wings with their tails going first,  
The heads going last, and their feet in reverse.  
And that might be a hint why just two of these birds  
Lived in the Gulligutt tree in Zazurds.

One's name was Gertrude and one's name was Jack  
She had red on her belly, he had red on his back.  
And they ate snickleberries and took-a-took seeds  
Which grew on the ground in the brambles and weeds.





Now Jack's favorite thing in all of the world  
Was to sit on a branch with his feet tightly curled  
And to chew on a mound of red snickleberries  
One by one, bite by bite, and forget all his worries.

As he ate the ripe berries, his mind set at ease,  
He spit out the seeds in the afternoon breeze  
And, all sticky with juice, they floated down slow  
And they stuck quite firmly to the branches below.

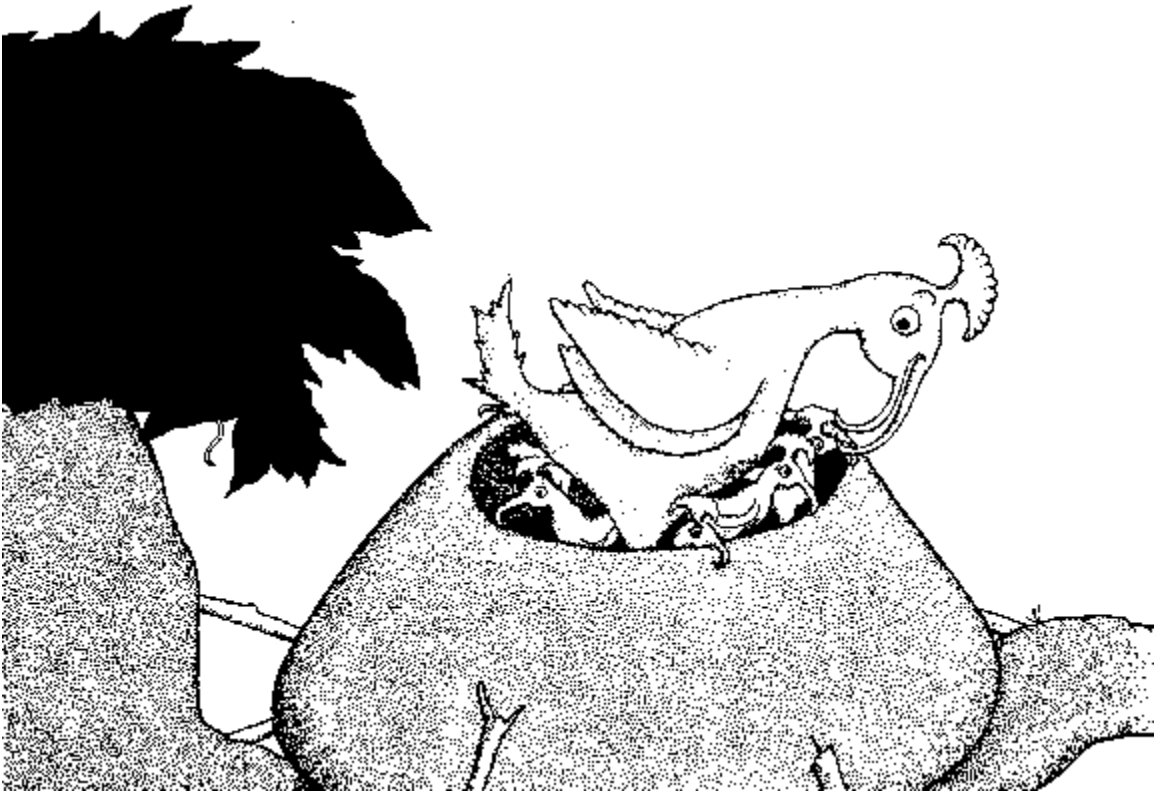
Gertie saw the seeds land, saw the snickle-seeds stick,  
But Jack's answer to her was clever and quick:  
"Why should we worry? What is there to fear?  
A few little seeds? I see no trouble here!"

So they scoffed at the seeds and Jack kept on chewing.  
I guess they were right, knew what they were doing!

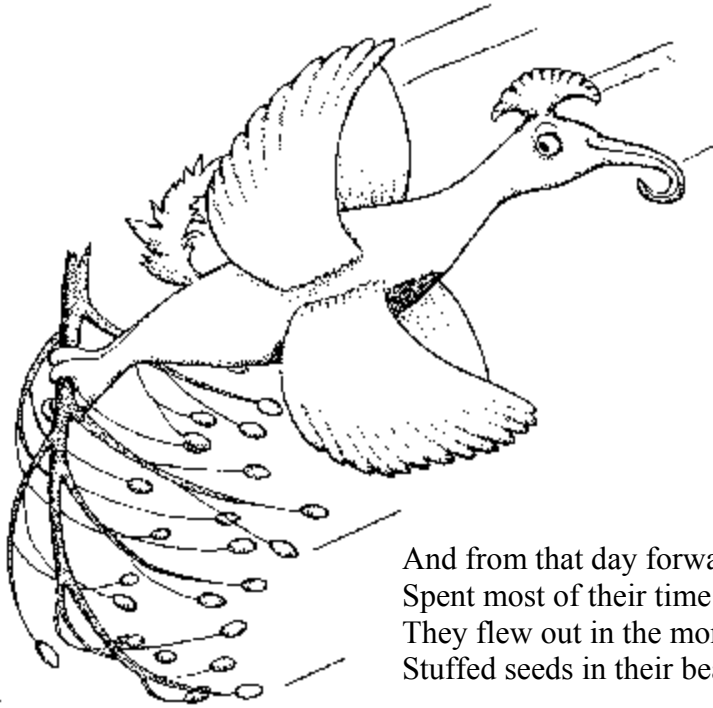
Now one day as Gertrude perched in the tree  
She suddenly felt a twitch in her knee.  
The twitching and itching grew, and it grew  
Her face turned yellow and purple and blue  
And she started to think she was losing her legs  
When in fact, she was...yes!...she was laying some eggs!

The first two were yellow, all shiny and new.  
The next two were purple, the last two were blue.  
And Jack, with a smile, nestled down in the nest  
And all winter and spring, warmed the eggs with his chest.

Finally, one morning, the 13<sup>th</sup> of May,  
Gertrude said, "Honey, today is the day!"  
And the eggs, how they rattled, the shells how they cracked!  
And six baby birds appeared under Jack.  
Two were blue, two were purple, and two were bright yellow,  
Half had red on their back, and half had red on their bellow.







And from that day forward, young Gertrude and Jack  
Spent most of their time flapping forward and back,  
They flew out in the morning, gathered up food,  
Stuffed seeds in their beaks, and returned to their brood.

What a job! How demanding! It took all day long  
To help the chicks grow to be healthy and strong.  
Why, the chicks ate those berries at such a fast rate  
That one day they gobbled six hundred and eight!  
Now, *you* might not believe that, but I'd bet on my life,  
'Cause those facts came straight from old B. J. McFife!

And B. J. says it's true that those Birds of Zazurds  
Would not stop at seconds or even at thirds,  
They would always eat fourths and usually fifths  
And one bird, once, had seventy-sixths!

So Gertrude one day developed a plan  
To speed up the process of feeding her clan.  
She stopped stuffing berries inside of her cheeks  
And instead plucked whole branches off trees with her beak.

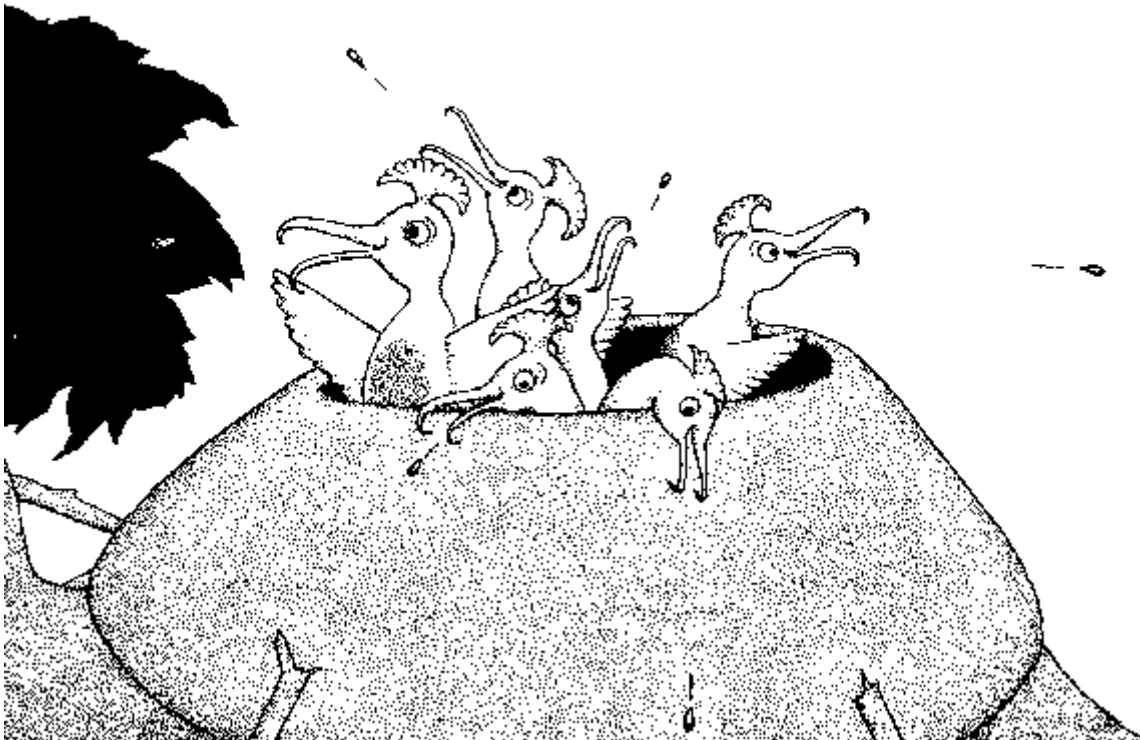
Then she could fly with the branch in her feet,  
The limbs trailing ahead, as she flew in retreat.  
Sometimes the branches would hold fifty berries!  
Enough to feed all of her chicks in one carry.

And though this was handy, though it saved lots of time,  
I'll bet there's a question that weighs on your mind:  
"What did they do with the branches and seeds  
Left at the end of their whole-family feeds?

Well, the little bird did what their Daddy would do:  
They spit out the seeds with a loud, "Puh-puh-TOO!"  
And they threw all the branches right out of the nest,  
Without really knowing where they all came to rest.

But I'll bet you know! You know where they landed!  
They got caught in the Gulligutt tree, and were stranded.  
They stuck to the limbs of the tree down below,  
And they made a small pile, and it started to grow.

It's a shame, to be honest, that you were not there  
In that part of Zazurds, to make them aware  
Of that tangle of branches, that big pile of junk  
That covered the tree from its leaves to its trunk.



Then you could have said, "What a terrible mess!"  
And demanded they clean it, though I must confess  
I'm not sure those messy old Birds of Zazurds  
Would have paid much attention to anyone's words.



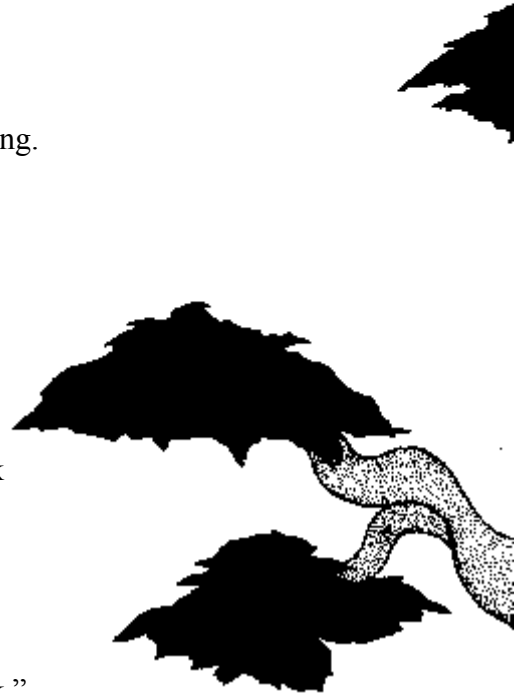
They would surely have smiled and thanked you profusely  
And said to themselves as they brushed you off loosely,  
"Why should we worry? What is there to fear?  
A few little sticks? We see no trouble here!"

So Gertrude and Jack brought more branches back.  
It saved lots of time, which let them relax.

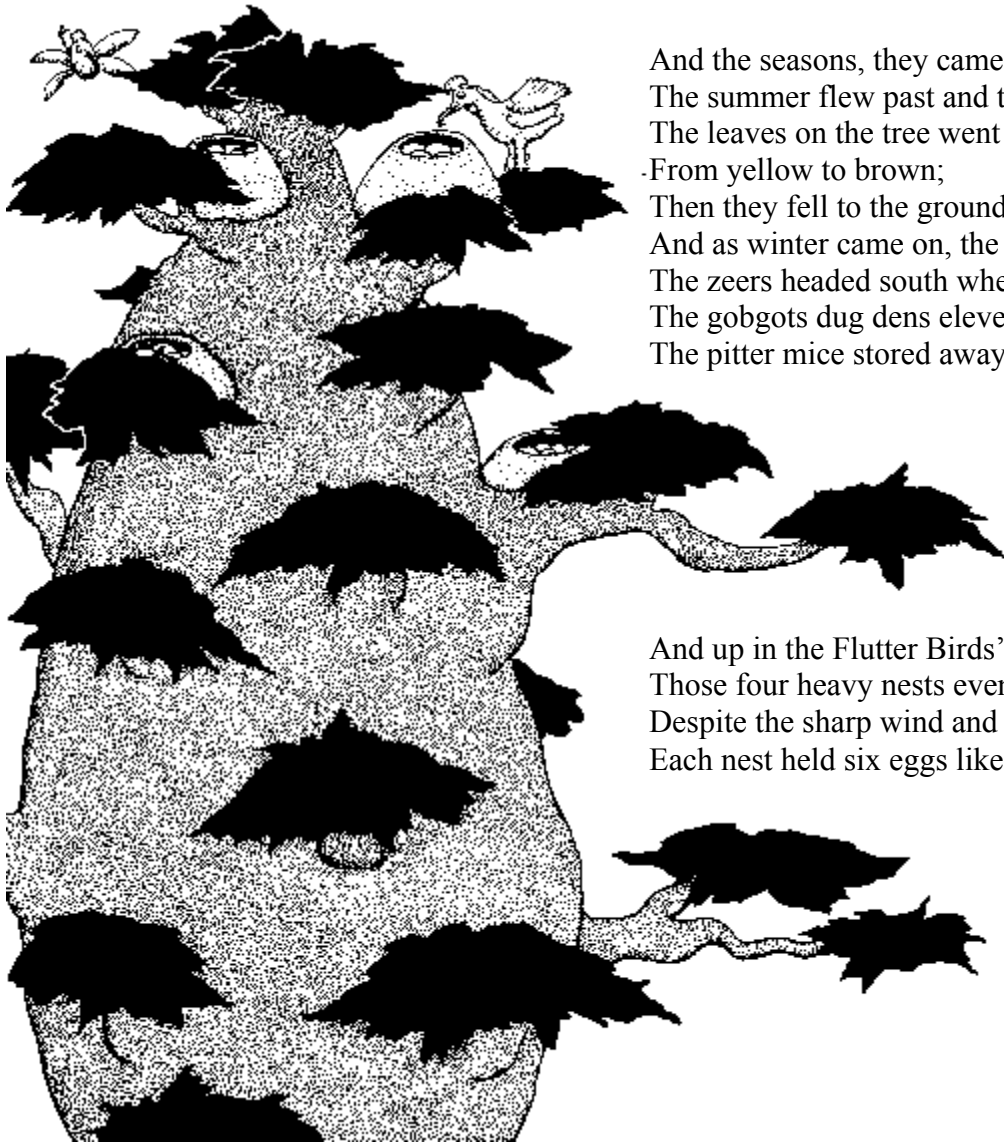
#### BREAK FOR DISCUSSION (optional)

Well, those young Flutter Birds were not young for long.  
Their bodies grew solid, their feathers grew strong.  
And soon, one by one, they leaped from the nest,  
Thrust forward their feet, and puffed up their chests,  
They flapped all four wings and let out a cry  
And fluttered away in the blue Zazurds sky.

So I asked McFife if Gertie and Jack  
Were afraid that their children might never come back  
But B. J. said, "No! Not afraid in the least!  
Did you forget? From Southwest to Northeast,  
No other tree in the world could support  
The weight of a nest of the Flutter Birds' sort.  
So those young Flutter birds would as surely be back  
As their mother was Gertrude, as their father was Jack."

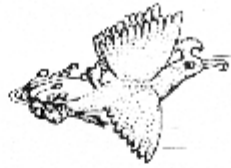


And B. J. was right, all the young birds returned  
And Gertrude and Jack were quite unconcerned.  
And those two proud parents were happy to see  
That several new nests soon appeared in the tree.

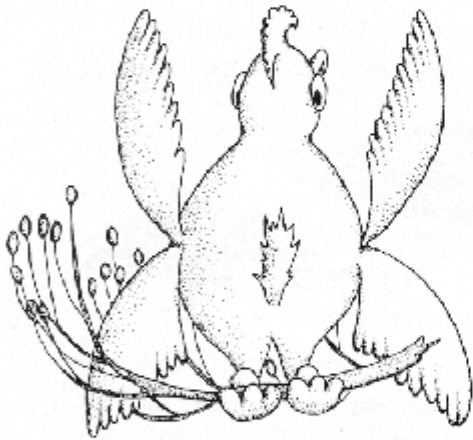


And the seasons, they came, and the seasons, they went.  
The summer flew past and the autumn was spent.  
The leaves on the tree went from lush green to yellow,  
From yellow to brown;  
Then they fell to the ground.  
And as winter came on, the forest transformed.  
The zeers headed south where it always was warm.  
The gobgots dug dens eleven feet down.  
The pitter mice stored away nuts underground.

And up in the Flutter Birds' tree, near the top,  
Those four heavy nests even heavier got,  
Despite the sharp wind and the terrible cold,  
Each nest held six eggs like nuggets of gold.

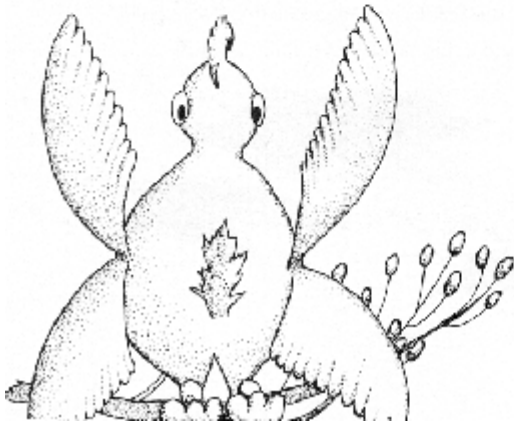


And when springtime returned and brought back the zeers,  
When the gobgots woke up and the mice reappeared,  
Those Flutter Birds' eggs all trembled, all cracked  
And made proud grandparents of Gertrude and Jack.



Then the forest was filled with melodious peeps  
With mellifluous chirps and harmonious cheeps  
You could hear that marvelous noise throughout Zife,  
Or so says my neighbor, old B. J. McFife.

And now all the mommies and now all the daddies  
Flew out to find took-a-took seeds for their laddies  
They carried back branches, they carried back sticks  
Which were bursting with berries and heavy, like bricks!

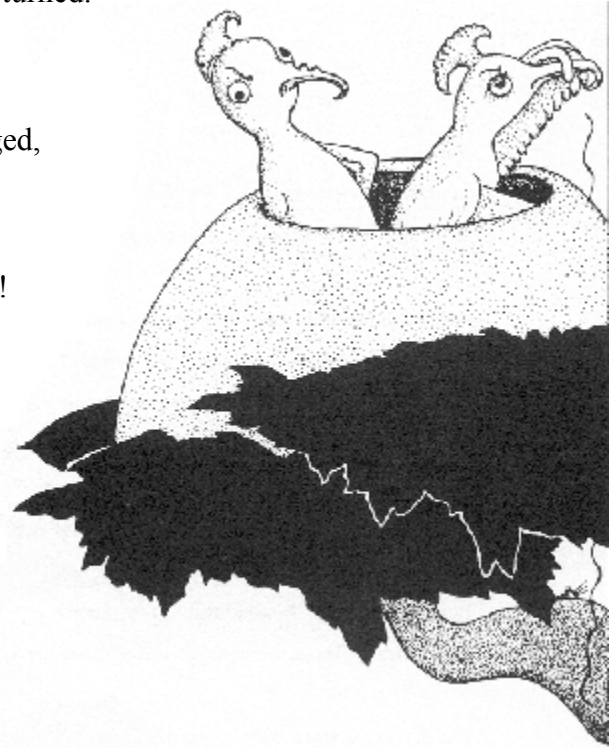


And when the birds finished with chewing their food,  
They spit out the seed –which *I* think is quite rude–  
And they threw down the stems without thinking at all.  
Now, the pile beneath them was no longer small.

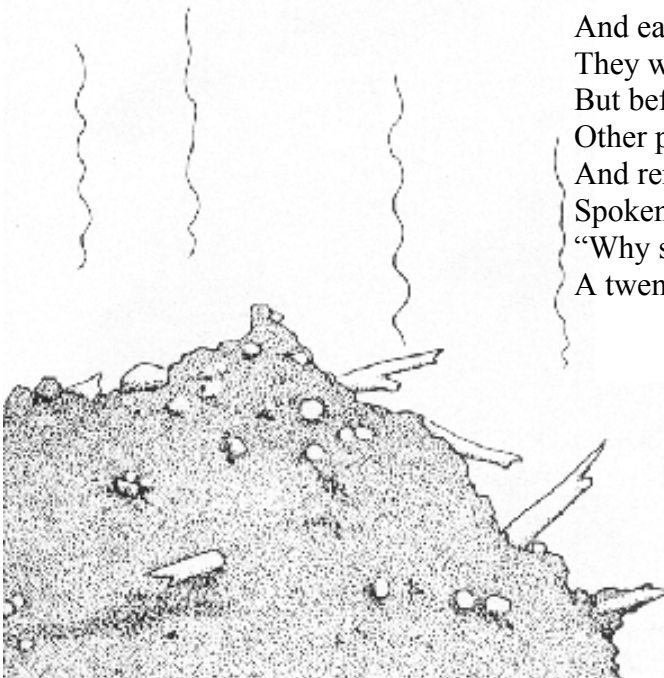
And sometime that summer, the new generation  
All learned how to fly, all flew off in formation  
And nobody worried, they all soon returned,  
And they all built their nests, and the seasons, they turned.

Fall brought the colors and winter brought eggs,  
Spring brought new chicks who hungered and begged,  
And summer brought plenty of berries and play  
And though I hate to admit, I really should say...  
That terrible, horrible thicket of junk,  
Well, it grew, and it grew, and it grew, and it stunk!

And that's how it went, just exactly like that,  
The year after that, and the year after that!  
The birds built their nests, the junk pile got fat,  
The year after that, and the year after that.



And each year there were birds who would look at the pile,  
They would look at the seeds, now rotten and vile,  
But before they could shout, "This pile's a disaster!"  
Other parts of their brain would work slightly faster  
And remember the words from many years back  
Spoken by great-great-great-grandfather Jack:  
"Why should we worry? What is there to fear?  
A twenty-foot pile? I see no trouble here."



But...

I guess they were wrong! They didn't know squat!  
What they did to that tree was not right. It was not!



And I wonder what ancestors Gertrude and Jack  
Would have said if they'd heard the terrible CRACK!  
Would they have said if they'd seen the tree leaning back  
Would have said if they'd seen all those branches go slack.

It just was too much! Too much weight weighing down!  
It's a wonder that tree didn't fall to the ground!  
But fall it did not! It stood right in its place  
Now, without the strength and without the same grace.

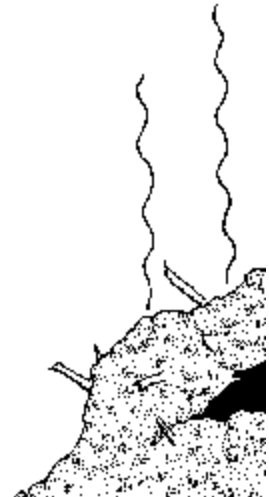


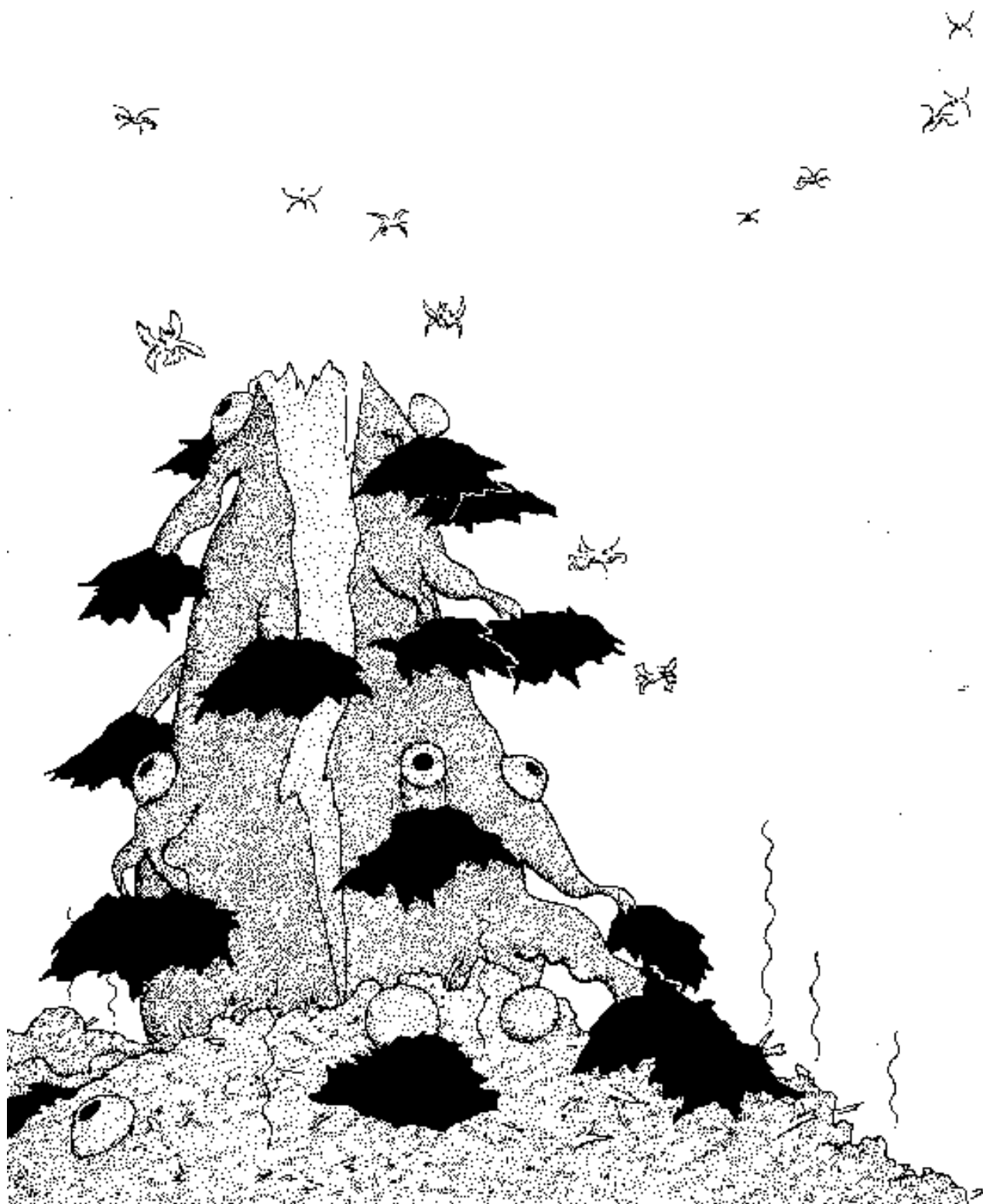
But that crack was a warning to those Birds of Zazurds  
A warning that 20 foot piles are absurd!  
And they'd better get working to clean up their mess  
Before worse things occurred and the problem progressed.

So they did get to work, they heeded the warning,  
They made up their plans that very same morning.  
They all stopped their playing, stopped flying, stopped eating,  
They flocked to the tree and they held a great meeting.



**BREAK FOR DISCUSSION OF POSSIBLE SOLUTIONS**







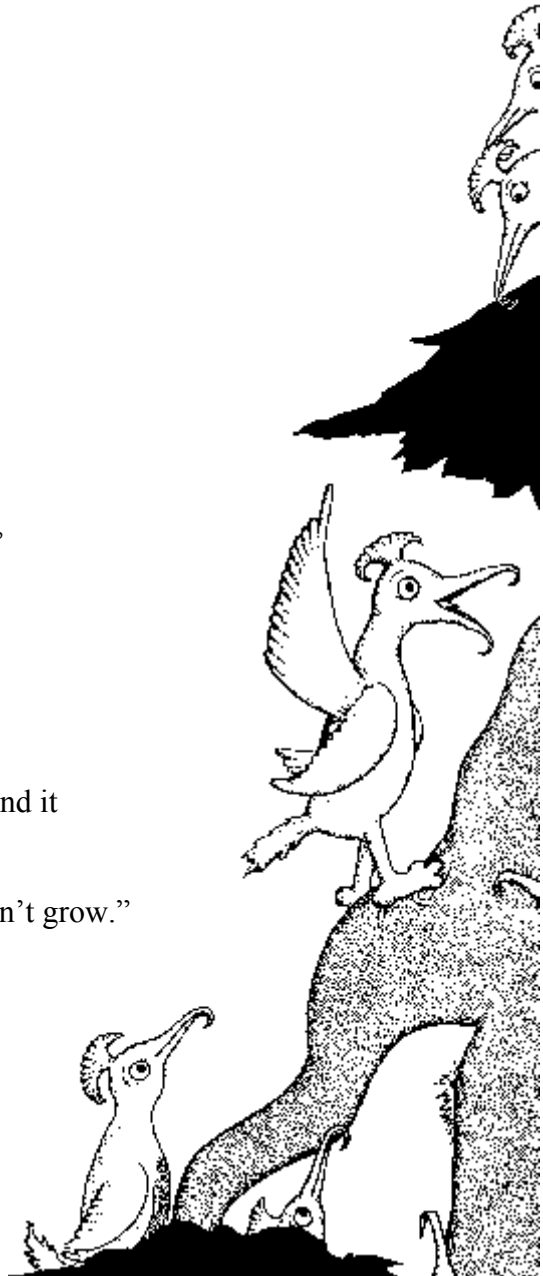
Now the first plan was brilliant, it came from a bird  
Named Jack Junior Jack Junior Jack Junior the Third  
And Jack was descended completely directly  
(You've probably already guessed it correctly)  
From the very first Gertrude and very first Jack  
Who settled that tree oh so many years back.

And Jack Junior the Third spoke to all of the birds  
And he spoke very loud so his words could be heard.  
He said, "Friends, the first thing I'll tell you today  
Is that we must change how we throw things away!"

"Spitting out seeds is a thing of the past!  
Throwing out branches must end now, at last!  
For all of this time it has seemed to be free  
To throw all our junk on our Gulligutt tree."

"But free it is not! It has a huge cost  
Our very own Gulligutt tree may be lost!  
And in some parts of Zife, the forest is bare  
And took-a-took plants have become downright rare."

"So I say to you all, my family and friends,  
This is the plan that I now recommend:  
Don't pluck off a whole branch of took-a-took seeds,  
Only take a small twig with the seed that you'll need.  
And the leftover branch? Clamp your beak right around it  
And return it right back to the place that you found it!  
Then the thicket of junk that lurks down below  
Won't expand, won't increase, won't enlarge, and won't grow."

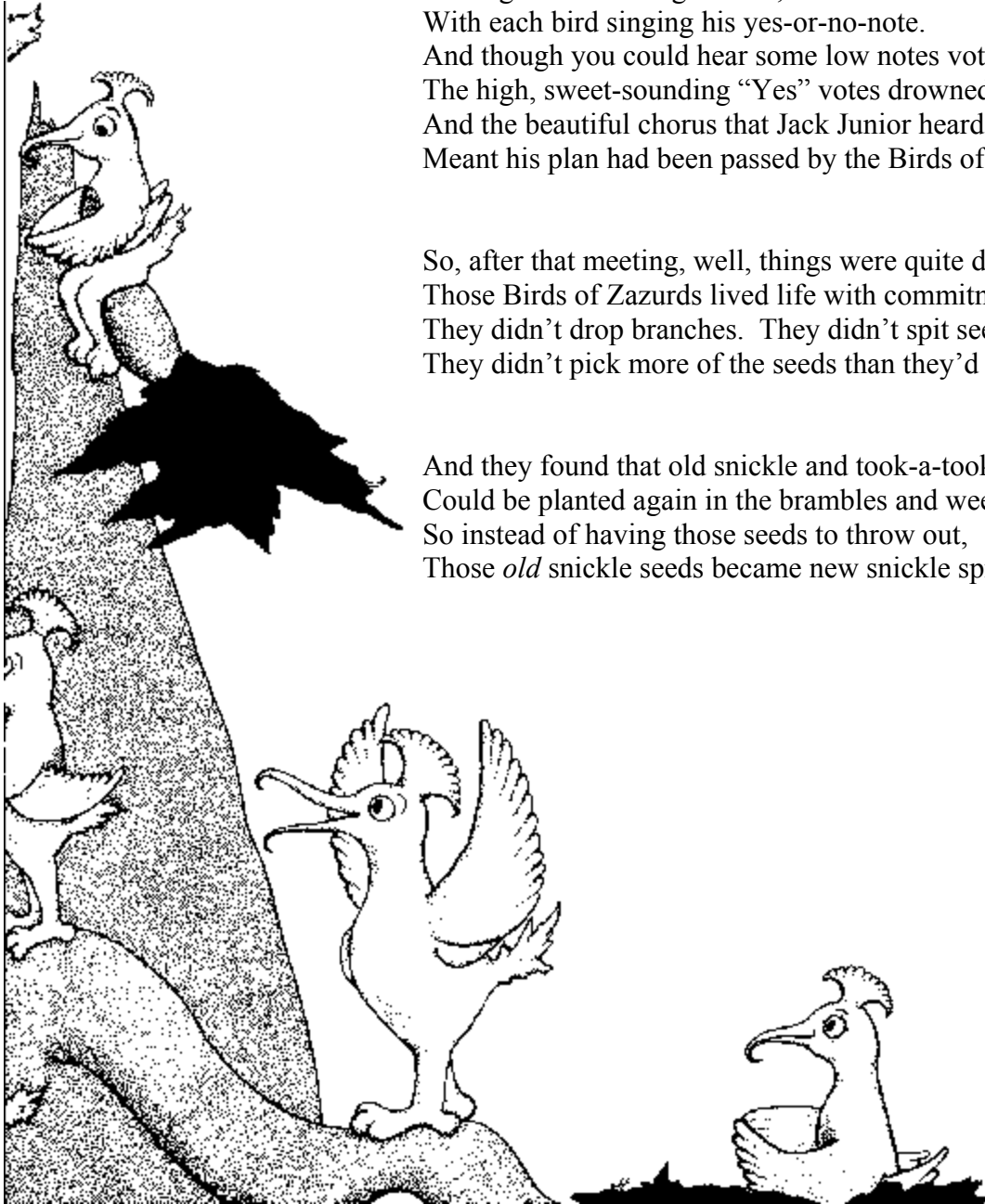


And then there were cheers and loud clapping of feathers  
And hundreds of Flutter Birds nodded together.  
And Jack Junior the Third said, "Do you agree?"  
"Agree we must stop throwing junk on our tree?"

And right then and right there, the birds took a vote  
With each bird singing his yes-or-no-note.  
And though you could hear some low notes voting "No,"  
The high, sweet-sounding "Yes" votes drowned out those below  
And the beautiful chorus that Jack Junior heard  
Meant his plan had been passed by the Birds of Zazurds.

So, after that meeting, well, things were quite different!  
Those Birds of Zazurds lived life with commitment!  
They didn't drop branches. They didn't spit seeds.  
They didn't pick more of the seeds than they'd need.

And they found that old snickle and took-a-took seeds  
Could be planted again in the brambles and weeds.  
So instead of having those seeds to throw out,  
Those *old* snickle seeds became new snickle sprouts.



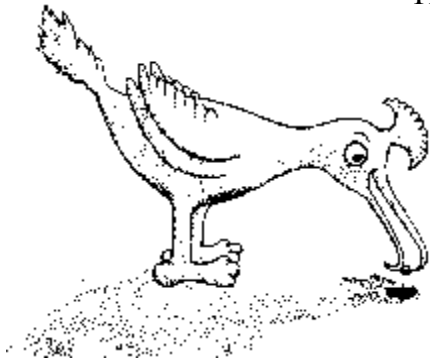
And the Birds of Zazurds planted every last seed  
That once had been stuck to their Gulligutt tree  
So that snickle and took-a took plants did abound  
And they covered the forest for miles around.

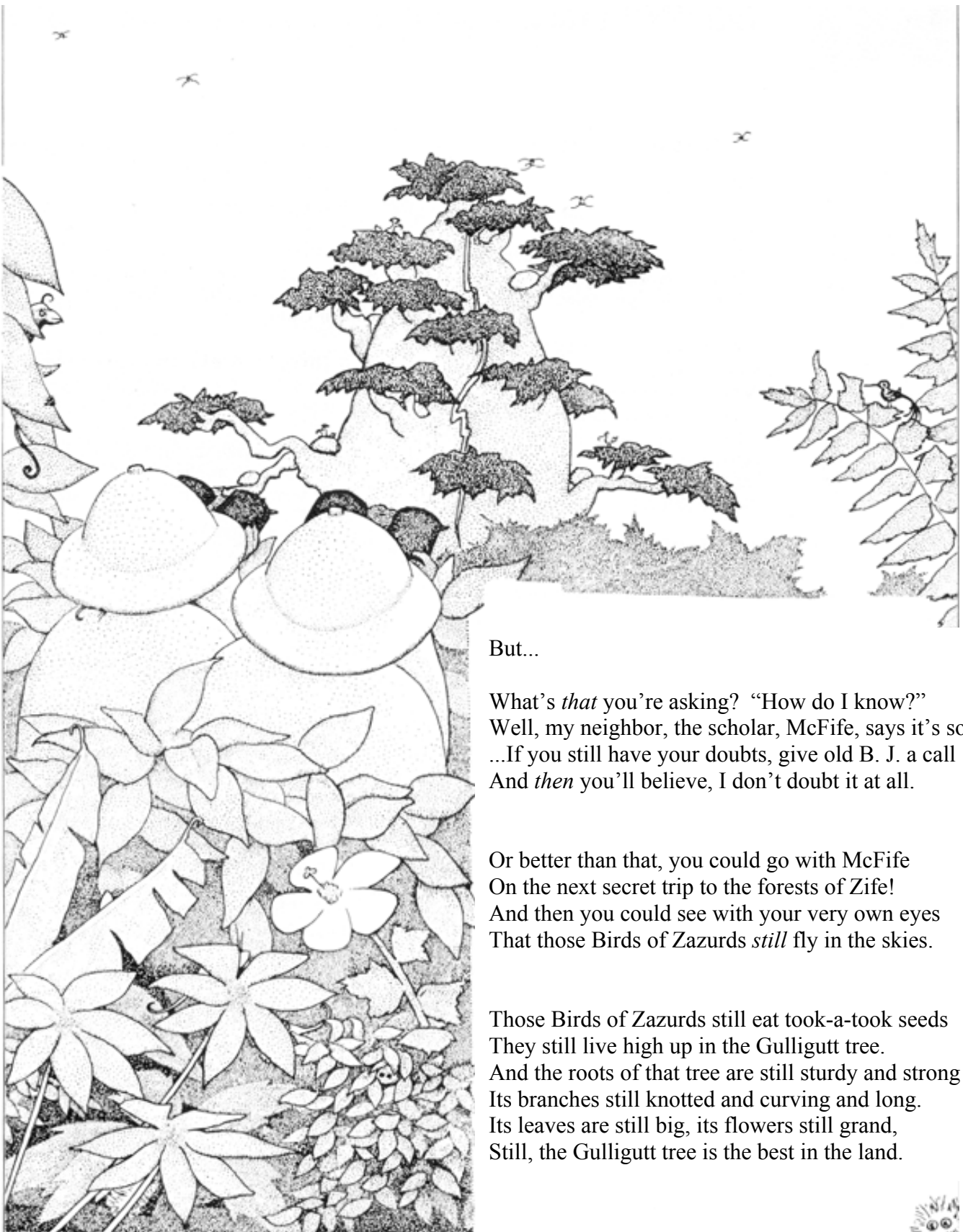
And it took a long time; it took several years  
But soon all the Gulligutt branches were clear!  
And then, after that... Well, would you believe?  
The Gulligutt tree heaved a sigh of relief  
And the Birds of Zazurds, well, they started to sing,  
For they knew they had done the exactly right thing!

Then the birds sang quite often, they sang sweet and loud  
They sang mostly because they were happy and proud.  
By working together, by having a plan,  
They had rescued their tree, they had rescued their clan!

And one day when Flutter bird Gertrude FlipFlupper  
Was planting some seeds leftover from supper,  
She fluffed up her feathers and threw back her head  
And with pride in her voice, she truthfully said:  
“No reason to worry! No reason to fear!  
The pile is gone! There is no trouble here!”

And you know, she was right! There was nothing to fear.  
The Gulligutt tree was out in the clear.





But...

What's *that* you're asking? "How do I know?"  
Well, my neighbor, the scholar, McFife, says it's so...  
...If you still have your doubts, give old B. J. a call  
And *then* you'll believe, I don't doubt it at all.

Or better than that, you could go with McFife  
On the next secret trip to the forests of Zife!  
And then you could see with your very own eyes  
That those Birds of Zazurds *still* fly in the skies.

Those Birds of Zazurds still eat took-a-took seeds  
They still live high up in the Gulligutt tree.  
And the roots of that tree are still sturdy and strong  
Its branches still knotted and curving and long.  
Its leaves are still big, its flowers still grand,  
Still, the Gulligutt tree is the best in the land.



## **The Birds of Zazurds** *Discussion*

### **First Discussion Session**

After the line ...It saved lots of time which let them relax.

1. What are the major problems facing the Birds?
2. Who (or what) is responsible for these problems developing?
3. What do you think might happen next?

### **Second Discussion Session**

After the line ...They flocked to the tree and they held a great meeting.

1. Why are the Birds having a meeting?
2. What are the problems now? (add ideas to the list)
3. What solutions do you think will help the Birds?

### **Final Discussion**

*If there was no discussion during the story, use the factual questions above to begin the final discussion.*

#### ● **Beginning**

1. What things did the Birds do to create their problem?
2. Was there a problem when there was only one nest? How did more nests and more birds make the problem worse?
3. What were the other problems facing the Birds?
4. What solutions did the Birds devise? Were they the same as yours? What other suggestions would you have for the Birds to solve their waste problem?
5. Why was it important for the Birds to change the way they threw things away? What other things did they have to do differently? Why wouldn't it have worked to have someone just take the mess "away"?

6. How did the solutions to the problems change the Birds' lives? Did it make their lives easier or harder? Was their life better? How?
7. What was special about the Gulligutt tree? Why did the young Birds return to the tree?
8. How are the Birds of Zazurds like people? How is the Gulligutt tree like your school? Your home? Your town?
9. Do people in your classroom (your school, your family) do things that might harm your Gulligutt tree?

#### ■ ♦ **Intermediate and Advanced**

1. When did the Birds' trash become a problem? Why wasn't it a problem before that?
2. So, was Jack right at the time when he said, "I see no problem here."?
3. What were the effects of increasing population?
4. How did the Birds' behaviors make their lives easier?
5. What solutions did the Birds devise? Were they the same as yours? What other suggestions would you have for the Birds?
6. How are the Birds of Zazurds like people? How is the Gulligutt tree like our homes and community?
7. How are the trash problems of the Birds like the problems people face?
8. What can we learn from the Birds of Zazurds?
9. If you went with B.J. McFife on his next secret trip to Zazurds, what do you think you would find? How might the Birds have changed since the end of the story?
10. Where do you think Zazurds is? Where is Zife? Who do you think B.J. McFife is?
11. Describe the narrator. How is the narrator like you?
12. Who is your favorite character? Why?

# The Birds of Zazurds Story

## *MLR Alignment Summary*

### ENGLISH LANGUAGE ARTS

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
B. LITERATURE & CULTURE	<b>K-2</b> #1 Understand the basic plot of simple stories.  #2 Draw logical conclusions about what will happen next or how things might have turned out differently in a story.	The first & second discussion sessions allow a chance to make sure students understand the plot. This time will also allow the students to make predictions about what will happen next. (ex., first discussion question #3: What do you think might happen next?)	
	<b>3-4</b> #2 Use literary pieces to better understand and appreciate the actions of others.  #3 Respond to speakers in a variety of ways (e.g., listening attentively, responding politely).  #7 Identify and explain how characters and situations found in various materials are like people or events in their own lives or in other works.	Final Discussion questions #1-9.  This story should provoke a variety of responses: laughter, shock, concern, etc.  Final Discussion question #8.	
	<b>5-8</b> #6 Recognize the use of specific literary devices (e.g., foreshadowing, flashback, different time frames such as the future or the past).  #7 Recognize complex elements of plot (e.g., setting, major events, problems, conflicts, resolutions).	The Birds of Zazurds uses both allegory and foreshadowing.  Intermediate discussion questions #1, 3, 10, 11, 12.	To best align, hold a discussion with students about the literary devices used in the story.
E. PROCESS OF WRITING & SPEAKING	<b>K-2</b> #2 Respond to stories orally and in writing.	Discussions to solicit oral response to story.	
	<b>3-4</b> #6 Summarize central concepts from oral presentations.	Final Discussion questions #1-7.	

	<b>5-8</b> #3 Ask questions and apply personal interpretations in class discussion following speeches and oral presentations.	Intermediate discussion questions #1-12.	
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## SCIENCE & TECHNOLOGY

<b>Standard</b>	<b>Performance Indicator</b>	<b>Evidence of Alignment</b>	<b>Notes for Adaptation</b>
M. IMPLICATIONS OF SCIENCE & TECHNOLOGY	<b>K-2</b> #4 Demonstrate some practices for recycling and care of resources.	Final Discussion question #4.	
	<b>3-4</b> #4 Explain practices for conservation in daily life, based on a recognition that renewable and nonrenewable resources have limits.	Final Discussion questions #2-5.	

**Level**

■ **Intermediate**

# ***The Birds of Zazurds Play***

**Materials**

**-Costumes and props the students devise**

**Overview**

*Students dramatize the Birds of Zazurds and put on a play for younger classes.*

**Objectives**

Students will interpret the story of the Birds of Zazurds, relate the story to their own lives and produce a play which demonstrates their understanding.

**Management Suggestions**

1. Arrange (or have students arrange) with other teachers to perform the play for younger classes in the school. The play might be presented to parents or taken “on the road” to other schools.
2. Avoid writing out lengthy scripts by making copies of the story. Have narrators and characters underline their lines.
3. More advanced groups may want to write more dialog into the story.
4. Try to have a part for each student. Several students can share the part of the narrator.

**Procedure**

1. Read the story and discuss it to process student understanding of the allegory and help the students relate the Birds to their own lives.
2. Plan the play with students:
  - List the characters

- Decide who will take each part, including narrator(s) and “extras”
  - Divide the story into “scenes”
  - Brainstorm ideas for props and costumes that would go with each scene
  - Decide on what dialog will be included in each part
  - Experiment with actions that can convey meaning to the story
3. Gather props and costume materials.
  4. Practice the play and logistics for putting the play on for others.
  5. Plan for discussion with the audience following the play – have students plan appropriate questions.
  6. Present the play and facilitate discussion with the audience.

**Discussion**

1. Discuss how the students’ understanding of the story has changed after presenting the play to other groups.
2. Brainstorm action steps the students might take to avoid developing problems with waste in school.



# The Birds of Zazurds Play

## *MLR Alignment Summary*

### ENGLISH LANGUAGE ARTS

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
G. STYLISTIC & RHETORICAL ASPECTS OF WRITING & SPEAKING	<b>5-8</b> #10 Deliver oral presentations that use a variety of strategies of address (e.g., eye contact, hand gestures, voice modulation, changes of rhythm).	Procedures #2 (* Experiment with actions that can convey meaning to the story) and #6.	

### VISUAL & PERFORMING ARTS

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
A. CREATIVE EXPRESSION	<b>5-8</b> #4 Use a variety of resources, materials, and techniques to design and execute art works.  #8 Perform a variety of styles and types of music, dance, and theater.	Procedures # 2 & 3.  Procedure #6.	
	<b>Secondary</b> #1 Create a visual or performance piece to communicate an idea, feeling, or meaning using: a distinct style; imagination and technical skill; and the creative process, reflection, and self-evaluation (problem-solving skills).  #4 Use the elements and principles of design to demonstrate multiple solutions to specific visual or performing arts problems.	Procedures #2, 3, 4.  Procedures #2 & 3. One particularly challenging element is the Gulligutt Tree - how will it be represented?	

**Level**  
◆ *Advanced*

## ***Zazurds II***

**Materials**  
-Materials for  
writing and  
drawing

### **Overview**

*Students write and illustrate a sequel to the story of the Birds of Zazurds.*

### **Objectives**

Students will analyze the Birds of Zazurds and create a story line which develops the concepts of waste management into another time.

### **Management Suggestions**

1. Arrange (or have students arrange) with other teachers to present their stories to younger classes in the school.
2. To help students understand allegory, have them read and discuss other environmental allegories (for example, *The Lorax* and *The Butter Battle Book* by Dr. Seuss).

### **Procedure**

1. Read the Birds of Zazurds and discuss the story to process student understanding of the allegory, and to analyze the waste management issues presented. Discuss how the problems evolved, what attitudes were responsible for the problems that developed, and how the problems were addressed. Analyze the characters, discuss how realistic they were, and how they could represent people.
2. List additional waste management issues students are familiar with that were not mentioned in the story. Imagine how these issues might be described in a Zazurdian (allegorical) setting.
3. Discuss imaginary scenarios that could take characters or situations into the future, or

before the time of the story. It may be helpful to start by taking an imaginary trip with B.J. McFife back to Zife. Students might imagine either a land where problems continue to be dealt with successfully, or where characters create new waste problems. Behaviors of the other animals mentioned in the story could be developed and those animals could interact with the birds. Consider the same story from the Gobgot's point-of-view, or as it might be told by B.J. McFife.

4. Have students write their sequels in prose or verse. Work individually, in pairs, or in small groups. Develop illustrations to accompany the story.
5. Edit and revise the works.
6. Read and discuss the sequels in class to further develop students' understanding of the issues and ideas for solving waste problems.

### **Follow-up**

1. After the writing has been edited and discussed in class, students can read both the Birds of Zazurds and the sequel to younger classes, and lead discussions following the stories.
2. Discuss student understanding of the waste management issues after having presented to other groups.
3. Brainstorm action steps the students might take to avoid developing problems with waste in school, at home, and in the community.

# Zazurds II

## *MLR Alignment Summary*

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### ENGLISH LANGUAGE ARTS

These are in addition to all performance indicators covered by The Birds of Zazurds Story.

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
E. PROCESSES OF WRITING & SPEAKING	<b>5-8</b> #2 Use planning, drafting, and revising to produce, on demand, a well-developed, organized piece that demonstrates effective language use, voice, and command of mechanics.	Procedure # 5.	
	<b>Secondary Grades</b> #3 Use planning, drafting, and revising to produce, on demand, a well-developed, organized piece that demonstrates effective language use, voice, and command of mechanics.	Procedure #5.	
G. STYLISTIC AND RHETORICAL ASPECTS OF WRITING & SPEAKING	<b>5-8</b> #1 Write stories with an identifiable beginning, middle, and end.  #2 Write stories that include major events, develop settings, and deal with problems and solutions.  #3 Write pieces and deliver oral presentations that use structures appropriate to audience and purpose.	Procedures #3 & 4.  Procedures #3 & 4.  Procedures #4 & 6.	
	<b>Secondary Grades</b> #1 Write stories that effectively develop such elements as setting, major events, problems, and solutions.  #11 Make effective use of a variety of techniques for introducing and representing ideas and insights in written work and oral presentations.	Procedures 3 & 4.  Procedure #4.	

**Level**

■ Intermediate

◆ Advanced

# Bread & Kisses

**Materials**

-One small loaf of bread

-Chocolate kisses (enough for each student)

**Key Question**

*How does consumption and life style relate to waste generation?*

**Overview**

*This is a simulation where one student (representing the population of United States) receives one fifth of a loaf of bread (the world's food supply) and one fourth of a bag of candy kisses (the world's resources); the rest of the class (the rest of the world) must divide the rest of the bread and candy among themselves. The activity shows the unequal distribution of resources around the world. Students draw conclusions about unequal waste production as well.*

**Objectives**

Students will understand that resources are unequally distributed around the world and that levels of consumption are related to waste generation.

resources, and control 20% of the world's food supply. The U.S. leads the developed world in consumption and production and far exceeds that of the emerging world.

The affluent lifestyles of many Americans lead to the production of far more waste per capita than most other countries in the world. The following chart compares waste generation in cities around the world.

**Background Information**

People in the United States account for 5% of the world's population, consume 25% of the world's

<b>Waste Generation Worldwide</b>		
<b>Pounds per person per day (ppd)</b>		
<b>City</b>	<b>Country</b>	<b>Daily Waste Generation</b>
Chicago	USA	5.00
New York	USA	3.97
Tokyo	Japan	3.04
Hong Kong		1.87
Hamburg	Germany	1.87
Medellin	Columbia	1.19
Calcutta	India	1.12
Kano	Nigeria	1.01

Although Americans consume a disproportionate amount of the world's resources, there are many factors to consider in evaluating U.S. affluence: technology, manufacturing capabilities, food and aid supplied to other countries, humanitarian services, and democracy.

### **Management Suggestions**

1. Plan this activity for a time that won't interfere with lunch appetites.
2. Allow for chaos when the world's resources are distributed.
3. If possible, have students wait until the results of the distribution are shared with the whole class before eating the resources.
4. Have additional candy on hand to help ease the feelings of inequity after the discussion is completed.

### **Procedure**

1. Have students calculate 5% of the class and choose a student (if there are twenty or fewer students) or students to represent that 5%. Explain that the one or two students represent the population of the United States, and the others represent the population of the rest of the world.
2. With the help of the students, divide the bread into fifths and the candy kisses into fourths.
3. Explain that the bread represents the world's food supply and the candy kisses represent the world's resources.
4. Give  $\frac{1}{5}$  of the loaf of bread and  $\frac{1}{4}$  of the candy to the U.S. group.
5. Toss the remaining bread and candy into the center of the "rest of the world" group and allow them to divide as they see fit.

6. After the group settles down, discuss the results. At a certain point, bring the bread and candy *wrappers* into the discussion.

### **Discussion Questions**

1. What were some of the feelings in the "rest of the world" group and in the U.S. group as they divided their portions among themselves?
2. Was the distribution fair?
3. Why do Americans consume as much as they do? Is this necessary?
4. Is there a relationship between wealth and waste?
5. How does the rest of the world benefit from the use of resources in the U.S.? What role does the U.S. play to improve the lives of others around the world?
6. What would happen if we brought in another 25 people to share the bread and candy? How does overpopulation in the "rest of the world" affect the distribution of resources?
7. What are some of the other causes of the inequitable distribution? Should we expect that the distribution of resources will change over time? What may be the cause of such changes? Should people take action to bring about such changes? What actions might be taken? What would be the costs and benefits of such actions?

### **Related Pathways**

1. This activity stimulates virtually unlimited pathways. It would enrich units on economic systems, developing nations, or differing lifestyles. Look around for opportunities here to work with teachers in other disciplines and members of the local business and non-profit community.

# Bread and Kisses

## *MLR Alignment Summary*

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### SOCIAL STUDIES

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
GEOGRAPHY A. SKILLS & TOOLS	<b>5-8</b> #2 Develop maps, globes, charts, models, and databases to analyze geographical patterns on the earth.	Procedure #1.	In order to best align, provide students with a map that illustrates population density of the countries represented in the chart.
GEOGRAPHY B. HUMAN INTERACTION WITH ENVIRONMENTS	<b>5-8</b> #3 Explain how cultures differ in their use of similar environments and resources.	Procedures #3 -5; Discussion #5 & 7.	

### SCIENCE

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
M. IMPLICATIONS OF SCIENCE AND TECHNOLOGY	<b>5-8</b> #7 Explain the connections between industry, natural resources, population, and economic development.	Discussion questions # 4-7.	

**Level**

- Beginning
- Intermediate
- ◆ Advanced

**Materials**

-Large metal wastebasket or other metal container  
-1 lb. dry split peas  
-5 lbs. dry kidney beans  
-chart with data  
-cups labeled individual, classroom, school, town, state for holding beans

## ***Drop in the Bucket***

**Key Question**

***What difference does my trash make?***

**Overview**

*In this demonstration a single pea represents the waste created by an individual daily, and a bean represents the waste created by about 200 people. As peas and beans are dropped into a large hollow container, students get a powerful auditory image of the waste disposed of daily in their school, town, and state.*

**Objective**

Students will compare the amount of trash produced by an individual, a school, a community, and Maine through a concrete auditory model.

**Background Information**

It is easy to feel like each of us is only a “drop in the bucket” when it comes to the waste problem.

The waste each person throws out every day may seem insignificant. But when we look at the accumulation of waste from a larger group, with each person producing 4.3 pounds every day, trash piles up quickly. This table shows how the trash problem is magnified when we look at groups around us.

***Daily Waste Generation by Group***

	<b><i>Population</i></b>	<b><i>Daily Waste</i></b>	<b><i>Pieces of “trash”</i></b>
Individual Person	1	4.3 pounds	1 pea
Class: Small	18	77 pounds	15 peas
Class: Large	28	120 pounds	24 peas
School: Small	200	860 pounds	1 bean
School: Large	500	1 ton	1 bean
Town	15,000	32 tons	32 beans
City	100,000	215 tons	215 beans
State (Maine)	1,250,000	2,700 tons	2700 beans
Country (U.S.)	265,000,000	530,000 tons	530,000 beans

***In this activity each pea represents about 5 pounds of trash and each bean represents a ton of trash.***

## Management Suggestions

● **Beginning** – Prepare the peas and beans ahead of time for the children to count. Mark each cup with the name of the group, the number of pieces, and what each piece represents. You may want to count the peas and beans ahead of time.

■ ♦ **Intermediate & Advanced** – Students can prepare the peas and beans themselves. They should mark their cup with group name and scale. Make a chart with the data that represents your school from the chart above, adding the name of your class, school, and town. ■ ♦ **Intermediate & Advanced** – You might have the students calculate the numbers of “pieces of trash” themselves, rounding to the closest pea or bean. Post the chart so each group can check the number of items it needs to count.

Place the wastebasket so it reverberates when the beans are dropped; make the sound as dramatic as possible by pouring the beans very slowly. Some teachers have increased the sound effects by using BBs instead of beans and staples (close the points by stapling “nothing”) instead of peas.

There are great opportunities here to work on estimating, averaging, graphing and large numbers. Can this be integrated with your math lesson?

## Procedure

Discuss how much trash each person makes in a day. Read the chart and compare the numbers for each group. Discuss the phrase “drop in the bucket.”

Divide the class into small groups, each to count out the appropriate number of beans or peas.

Have each group find the number of beans or peas to count, according to the chart.

Have the groups count the number of beans or peas and collect them in the appropriate cup. Be sure each cup is labeled.

Identify each cup and discuss how much trash each pea or each bean represents.

Seat students close to the wastebasket; ***have them close their eyes.***

Announce what the cup represents, e.g. “This sound represents the waste produced every day by each one of us;” ***slowly*** pour the pieces from the cup into the wastebasket.

Repeat for the other cups.

## Discussion Questions

After all the cups have been poured, elicit student reactions to the different sounds, compare amounts of waste generated by various groups in Maine.

Does it matter what one person throws away? How?

How can an individual, a class, a school, or a town make a difference in how much waste is produced and has to be disposed?

## Related Pathways

Follow up this activity, along with ***How Much Trash***, by inviting your community recycling coordinator or public works director into class to discuss how much trash your community generates and where it goes. It is sometimes a good idea to provide outside experts an advanced list of questions you would like answered, and students can help with this.



# Drop in the Bucket

## *MLR Alignment Summary*

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### MATHEMATICS

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
A. NUMBERS AND NUMBER SENSE	<b>K-2</b> #1 Demonstrate an understanding of what numbers mean.  #3 Order, compare, read, group, and apply place value concepts to numbers up to 1,000	Procedures #3 - 5.  Procedures #3 - 5.	
	<b>3-4</b> #1 Read, compare, order, classify, and explain whole numbers up to one million	Procedures #3 - 5.	
	<b>5-8</b> #2 Demonstrate understanding of the relationships among the basic arithmetic operations on different types of numbers.  #4 Represent numerical relationships in graphs, tables, and charts.	Management Suggestion #3 - Have students calculate the numbers of "pieces of trash" themselves."  Management Suggestion #3 - Have students make a chart that represents your school based on their calculations.	
C. DATA ANALYSIS & STATISTICS	<b>K-2</b> #1 Make tallies and graphs of information gathered from immediate surroundings	Procedures #3 - 5.	To best align, have students graph the amount of waste produced by each group.
	<b>3-4</b> #1 Make generalizations and draw conclusions using various types of graphs, charts, and tables.  #2 Read and interpret displays of data.	Procedures #3 - 5.  Procedures #3 - 5.	To best align, have students graph the amount of waste produced by each group. Also, refer to Management Suggestion #3.

## Level

■ Intermediate

◆ Advanced

# For Better or Worse

## Materials

-Boxes or packages from home that demonstrate both wasteful and low-impact packaging

- Multi-layered, difficult-to-recycle packaging
- Single serving items
- “natural” packages (apple, peanuts)
- concentrated products and light-weighted packaging (laundry detergent)
- Packaging from renewable resources (paper)
- Packaging from recyclable resources (glass bottle, aluminum can, steel can)
- Similar products in “better” and “worse” packaging
- Recycled content packaging

## Key Question

*How can I make good decisions about packaging I buy in the store?*

## Overview

*Given a variety of empty packages, students arrange them in order from “better” to “worse” considering the environmental impact of the packaging material. A small group discusses the items to reach consensus about the sequence. In the process they learn about the qualities of efficient, low-impact packaging as well as how to recognize excessive, wasteful packaging. They also evaluate their family’s and their own purchasing decisions. Students can provide materials by bringing a variety of clean, empty packaging from home.*

## Objectives

Students will compare the packages of consumer items; they will evaluate the environmental impact of packaging and propose actions they can take to reduce excess packaging.

## Background Information

Packaging serves many functions: to provide protection of a product from damage, to preserve freshness, to provide security from tampering, to prevent theft, to help advertise and for consumer convenience. Packaging and advertising certainly influence what people buy. Although we have many options in the marketplace, many of us pay extra for convenience that we don’t really need. Efforts are being made by many manufacturers to provide packaging that is less wasteful, both in terms of the energy and natural resources used in manufacturing and in the contribution to the waste stream. One way to reduce the amount of waste we generate is by making thoughtful choices when we buy packaged products. Look for the manufacturer’s environmental statement on the

label. Be objective, however, about the information provided and evaluate the information. Gray-colored paperboard (the type used in many cereal boxes) is usually made from recycled paper.

Packaging is one of the many things we think about when deciding to buy a particular product. There are many different perspectives when you consider packaging: How safe is it? How strong is it? How expensive is it? How well does it serve its purpose? Another important perspective asks, How environmentally sound is it? The goal of this activity is to have students look at packaging from the perspective of its environmental impact.

Packaging can be evaluated for environmental impact by considering:

- How renewable are the resources the packaging is made from?
- How easy is it to recycle the packaging?
- Is the packaging made with recycled materials?

- Is the packaging made from multiple layers (paper, plastic, metal, etc.) which are particularly difficult to recycle?
- Has the packaging been designed to use less material ("light-weighted")?
- Does it contain a concentrated product so less packaging is needed per unit of product?
- Does it contain a hazardous product which might contaminate the package and make it difficult to dispose of the package safely?
- Does it contain small individually wrapped units?
- Could it be sold in bulk, eliminating the need for manufactured packaging?

### **Management Suggestions**

1. The first part of the activity helps prepare students with information about the environmental impact of different types of packaging.
2. The second part gives students the opportunity to use this information to evaluate a large group of packages and make decisions.
3. Encourage students to be objective about their items. They should discuss how the items compare, and they should discuss the aspects of their items and agree where they fit in the line. If there are arguments, the teacher can use the opportunity to help look objectively and resolve the differences with the help of the group.
4. *Students should consider the packaging **only**, not the contents.* This is difficult, but if they think of the contents of all the packages as the same product, for example, raisings, it is easier to make consistent judgments.

### **Procedure**

#### **Part 1**

1. Place four items on a table in front of the class. Make the selection as diverse as possible. Have two students arrange the items from environmentally "best" to "worst" on the

basis of packaging. Have the students line the items up, discussing among themselves as they go along.

2. Discuss their decisions using the categories listed in the Background Information.

#### **Part 2**

3. Have each student choose an item as "their own."
4. Students then must decide if their item is "better" or "worse" than the others and get into their place in line. Students should discuss *and agree* that each person is in the best place in the line.
5. When the line is settled, have each student give one observation about the package that helped her or him decide this was the best spot in line.

### **Discussion Questions**

1. What was environmentally "better" about some items and "worse" about others?
2. In choosing products and packaging, do all people have the same likes and dislikes; the same needs?
3. How could some of the "worse" items be redesigned to be made "better"?
4. When would you choose not to buy a product because of the packaging?
5. What other things could we consider when choosing "good" and "bad" packaging?
6. What steps can you take to encourage manufacturers to limit excess packaging or inform consumers not to buy products with excessive packaging?

### **Related Pathways**

1. Advanced students might go on to judge the packaging "better or worse" according to other criteria (cost, safety, appropriateness, strength, attractiveness), and then according to several criteria at once (environmental impact, cost, and appropriateness). How should the criteria be "weighted"?

*Adapted from an activity (adapted from CONEG) by Gayle Briggs, planner for the Maine Waste Management Agency Office of Waste Reduction and Recycling.*

# For Better or Worse

## *MLR Alignment Summary*

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### SCIENCE & TECHNOLOGY

This activity may also be expanded to the realm of social studies/economics by following the “Related Pathways.”

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
M. IMPLICATIONS OF SCIENCE & TECHNOLOGY	<b>3-4</b> #4 Explain practices for conservation in daily life, based on a recognition that renewable and non-renewable resources have limits.	Students will evaluate packaging based on “environmental impact by considering: How renewable are the resources the packaging is made from?”	
	<b>5-8</b> #1 Research and evaluate the social and environmental impacts of scientific and technological developments.	Students will be evaluating packaging based on how easy it is to recycle, how it is made, whether it is multi-layered, etc.	
	<b>Secondary Grades</b> #4 Analyze the impacts of various scientific and technological developments.	Students will be evaluating packaging based on how easy it is to recycle, how it is made, whether it is multi-layered, etc.	

**Level**

- **Beginning**
- **Intermediate**
- ◆ **Advanced**

**Materials**

*Examples (or pictures) of antique toys*

*Examples of modern toys*

# ***If Toys Could Talk***

## ***Key Questions***

***How have toys changed from the days when our grandparents were young? How was our grandparents' waste different?***

## ***Overview***

*Students bring in toys from home and collect "antique" toys from their parents' and grandparents' childhood. They examine the toys and compare how materials have changed over the years. They draw conclusions about how their lives are different from their grandparents'.*

## **Objectives**

Students will compare the products they use today to those used by their parents and grandparents; they will describe how lifestyles in our country have changed over time and how the waste we generate has changed over time.

## **Background Information**

Most products, including toys, have changed significantly over the years. Through the early part of the 1900s, most toys were made from natural materials such as wood. Handmade toys like whirligigs, bean shooters, yo-yos, and tops were very popular. Over time, commercially manufactured toys like wooden Lincoln Logs™ and Tinker Toys™ became available. In the 1960s, plastic toys began to dominate the market, and the demand for hula hoops, Frisbees™,

Lego™, toy guns, and plastic models increased steadily. Today, battery operated and electronic toys are very popular, along with video and computer games.

Toys are a metaphor for the American waste dilemma. A number of factors, including manufacturing capacity, marketing strategies, and a rising standard of living, have filled American homes with more and more and more toys. Growth in the consumption of toys has not been unlike growth in the consumption of other material goods. Changes in the way toys are made, in what they can do, in the materials used to produce them, and in the number of toys marketed, reflect changes in our society, and they have *produced* changes in our society, including a big increase in solid waste.

## **Management Suggestions**

1. Send a note home to parents, describing the activity, and perhaps listing a few of the questions students have about old-fashioned toys. Provide a space for the parents' simple drawings of toys they remember. Older students might prepare this "parent homework" themselves. Ask parents for their input. Let them (and the students) know that if for any reason they are uncomfortable about sending in toys –old or new- that pictures or drawings will make a perfectly good substitute.
2. If possible have a grandparent visit school to be interviewed by the children. Have the students plan questions to ask or use the questions below to help with the interview.
3. The toys and pictures of toys will make good objects for a variety of classifying and grouping activities for young children.
4. While the class is looking over this collection of toys, take the opportunity to teach about the 3 R's of waste management: REDUCE, REUSE, and RECYCLE (see discussion question #5).

## **Procedure**

1. Have each student bring to school a broken toy or a toy that will be thrown away and (if possible) a toy used by their parents or grandparents.
2. Discuss which toys are their favorites and why.
3. Divide the toys into groups of "modern" and "old-fashioned".
4. Compare the two groups – look at and discuss:
  - What materials are the toys made of?
  - How long did the toys usually last?
  - If they break, can they be fixed?
  - Would it be cheaper to fix the toy or buy a new one?

- When it could no longer be used, what would happen to it?
- How many toys do you have, how many toys did your parents (and grandparents) have?

## **Discussion Questions**

1. How have toys changed since your grandparents were young?
2. Are there more toys around today than there were when your grandparents were young? Why?
3. What do you do with toys that break? What about toys that you no longer play with?
4. Which kind of toys are the most fun to play with? Do you think your grandparents would have said the same thing? Why?
5. What are some of the things that you could do to make the amount of toy waste smaller?
6. How is the toy problem like the problem with too much waste in town?
7. What can you do to REDUCE the amount of waste that has to be thrown away?

## **Related Pathways**

1. Discussion Question #5 can lead directly to group action projects for even the youngest students. Is there a toy library in your community? The class might visit and make donations. What about other ways of donating, sharing, swapping, and fixing?
2. This is an excellent opportunity to get local retired people – whether or not they are grandparents – into your classroom to make a clear contribution. Help students develop interview questions, which could begin with a focus on toys and move outward into many areas.
3. With this introduction other historical topics present themselves. How did schools use and dispose of materials in our grandparents' time? Restaurants? Manufacturers?

*Adapted from AVR Teacher's Resource Guide (1990) with permission from the Association of Vermont Recyclers, PO Box 1244, Montpelier, VT 05601; (802)229-1833.*

# If Toys Could Talk

## *MLR Alignment Summary*

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### SOCIAL STUDIES

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
HISTORY B. HISTORICAL KNOWLEDGE, CONCEPTS, AND PATTERNS	<b>K-2</b> #1 Demonstrate an understanding of the similarities between families now and in the past, including daily life today and in other times.	Discussion Questions #1-4.	
HISTORY C. HISTORICAL INQUIRY, ANALYSIS, AND INTERPRETATION	<b>K-2</b> #1 Use artifacts and documents to gather information about the past.	Procedures #1 & #4	
	<b>3-4</b> #1 Identify changes currently occurring in their daily lives and compare these to changes in daily life during a specific historic era.	Discussion Questions #1-4..	

**Level**

● *Beginning*

## ***Mounting Milk Cartons***

**Materials**

-Milk cartons  
(rinsed and drained)  
collected school-  
wide for a day  
(week)  
-Large roll paper for  
tracing student body  
shapes  
-Markers  
-Glue for attaching  
cartons to paper

**Key Questions**

***How fast does milk carton trash accumulate in our school?***

**Overview**

*Students collect large numbers of empty milk cartons from the school lunch program and use the cartons for construction projects. They glue the cartons to their body shape outlines and can calculate the number of “carton people” the school creates every day. This gives them concrete images for the amount of trash they help generate, and they see how fast that trash accumulates. They follow-up by considering ways to reduce the waste, not compromise their health by drinking less milk.*

**Objectives**

Students will show how common disposable items become trash that mounts up and must be discarded.

**Background Information**

Milk is considered an important and healthy staple of the American diet. Elementary school students often drink two half-pint cartons of milk each school day. Although the cartons provide a sanitary, easily handled package for milk, they have many drawbacks. The full cartons take up a lot of delivery truck and refrigerator space. The high level of consumption generates a large amount of non-recyclable trash daily, which needs to be landfilled or incinerated.

Some Maine schools compost milk cartons with other organic cafeteria waste. This is a difficult process, and the plastic coating on the cartons can be a problem in composting.

Maine dairies are exploring alternatives to the disposable plastic coated paper half-pint cartons. Dairies in several states sell alternative half-pint milk packages to schools. One is a returnable, refillable Lexan (plastic) half-pint milk container. The other is a light-weight, recyclable plastic pouch. While there are disadvantages for each of these alternatives, both create less waste and conserve resources. Dairies compete for school milk contracts which makes the industry responsive to consumer demands. Dairies will respond to requests for alternative packaging to reduce waste in school.



### **Management Suggestions**

1. Estimate how many cartons you will need to fill in a student's outline (as many as 60). Compare this to the amount of milk (and the number of cartons) purchased by the school daily/weekly. Anticipate how long you will need to collect cartons to fill in the outlines of several students.
2. It is more dramatic if enough cartons can be accumulated in a few days or a week (this shows how fast trash is generated).
3. Collect, rinse, drain, and store milk cartons until enough have been collected.
4. If every student won't get his or her outline drawn, consider how those who get drawn are chosen.
5. **Alternative Projects:** Use a wire frame and string cartons together to make a three-dimensional "carton person", or staple cartons together to make a life-like model. Consider making models of other objects – a house, a truck, a table.
6. The object of this activity is not to get students to drink less milk, but to understand how much waste they help create. Follow up by discussing alternatives to using disposable milk cartons.

### **Procedure**

1. Working in small groups, have students draw their body outlines on large pieces of paper.
2. Estimate the number of milk cartons needed to fill in the body shape.

3. Glue cartons to the paper.
4. Count the number of cartons on a figure. Compare to the estimates.
5. Display the "carton people" in a prominent place in the school. Include some facts about how much of the school trash is made of milk cartons. Keep a running tally of the "number of cartons used" on a thermometer-type graph.
6. Plan how you will discard the projects when you take the display down.

### **Discussion Questions**

1. How many milk cartons are used in the school in a day? Week? Where do the empties go?
2. What are the alternatives to using milk cartons in the school?
3. Who do we mean by the word "resource"? What resources are used up if we use disposable containers for our milk? Recycled containers? Refilled containers?
4. What other disposable packages or items are used regularly in the school? How can this waste be reduced?

### **Related Pathways**

1. When it comes to packaging, different decisions are often made at home and at school. Students might ask parents why they buy milk in large containers while the school uses many tiny ones. Compare how most homes and schools buy peanut butter. What are the reasons for the differences? What are the effects on the amount of waste?

# Mounting Milk Cartons

## *MLR Alignment Summary*

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### VISUAL & PERFORMING ARTS

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
A. CREATIVE EXPRESSION	<b>K-2</b> #10 Demonstrate ways in which the arts can be used in interdisciplinary activities.	Milk cartons will be used to create milk carton people - both an art project and an expression of awareness of resource conservation.	

### MATHEMATICS

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
B. COMPUTATION	<b>K-2</b> #1 Use and apply estimation with quantities, measurements, computations, and problem-solving.	Procedures #2 & 4; Discussion question #1.	
C. DATA ANALYSIS & STATISTICS	<b>K-2</b> 2 Make tallies and graphs of information gathered from immediate surroundings.	Procedure #5.	

### CAREER PREPARATION

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
D. BALANCING RESPONSIBILITIES	<b>K-2</b> #3 Demonstrate an understanding of the conservation of resources.	Discussion questions #1-4.	

**Level**

● **Beginning**

■ **Intermediate**

# Trash to Art Festival

## Overview

*This is a class- or school-wide activity where students gather materials that are being thrown away to create unique “art” projects. With few rules or limitations, students are asked to gather materials and do the construction at home, then bring their creations to school for a festival to be displayed. Prizes are awarded.*

## Background

Many household throw-aways are reusable:

- Glass jars to store food and small items
- Paper and plastic bags for storage and shipping
- Washable plastic dinnerware
- Plastic containers for storing leftovers and for freezing foods
- Washable aluminum pie tins
- Polystyrene packing peanuts for mailing your own packages

However, there are items that eventually must be discarded. This activity is a final attempt to make “valuable” use of some of those items. Possibilities for trash-to-art projects include collage, masks from plastic jugs, flower pots, bird feeders, sculptures, robots, or 3-D models. The list is limited only by students’ imagination.

## Planning Considerations

1. Items of trash must be clean.
2. Ask school administrators and community leaders to be judges.
3. Give students enough time to complete the projects at home, but not too long. One or two weeks is a reasonable time frame and avoids having projects create clutter.
4. Younger students or special groups may benefit from constructing projects in-school.
5. Arrange for the dismantling and recycling of as many of the components as possible. Students should plan to take their projects home if they can’t be recycled. It would be counter-productive if the projects were left at school for the custodian to throw in the dumpster.
6. Communicate with parents about the projects so they can get involved. Send home

information about recyclables, reusables, and waste reduction to get the families involved with waste reduction.

## Suggestions for a Successful Festival

1. The basic rule: Each project must use only items that would be thrown out. You might bend this rule by saying that glue or other “non-trash” fasteners are acceptable. Projects can be two-dimensional (like a painting or a collage) or three dimensional “sculptures” or models. They should be stable enough to be transported to school.
2. Provide a few examples to get the students motivated. A lead class could make a few items in school from school trash (like milk cartons!) to spark the imagination of other students.
3. Have students work in pairs or small teams. Some students may choose to work independently.
4. Have students describe their progress (progress reports or drawings) part way through. They may be able to share ideas or encourage those who are having a hard time.
5. Establish categories upon which the projects will be judged: creativity, most recyclable, best working model, neatest, etc. There can be any number of fun or made-up categories to include as many winners as you like.
6. On the day of the festival, include other displays to teach about waste reduction, reuse, or recycling. Have students bring in redeemable cans and bottles as a fundraiser.
7. Have the operator of your transfer station or a waste hauler present the awards.

### **Follow-up**

- Brainstorm ways to dismantle or recycle the projects.
- Use the enthusiasm from the festival to kick off other action projects or fundraising activities.
- Be sure that photographs of some of the most popular creations (and their creators!) appear in local newspapers.

# Trash-to-Art Festival

## *MLR Alignment Summary*

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### VISUAL AND PERFORMING ARTS

Because of the numerous opportunities for alignment that this activity offers in visual arts, the following summary may not be complete.

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
A. CREATIVE EXPRESSION	<b>K-2</b> #2 Experiment with art forms.  #10 Demonstrate ways in which the arts can be used in interdisciplinary activities.  #14 Use materials and tools in a safe and responsible manner.	This project allows for collage, sculpture, models, etc.  Art is being used to demonstrate reuse and educate about resource conservation.	
	<b>3-4</b> #4 Create original works using different media, techniques, and processes to communicate ideas, feelings, and meaning.	Each project must use only items that would be thrown out, encouraging students to be creative with media, technique, and materials.	
	<b>5-8</b> #3 Discriminate among the qualities and characteristics of art media, techniques, and processes for the purposes of selecting appropriate media to communicate artistic ideas.  #4 Use a variety of resources, materials, and techniques to design and execute art works.	This project allows for collage, sculpture, models, etc.  Each project must use only items that would be thrown out, encouraging students to be creative with media, technique, and materials.	
	<b>Secondary</b> #6 Demonstrate an understanding that the arts are a means of renewal and recreation, as well as an occupational opportunity.	This project demonstrates that through art students may give new life to otherwise wasted materials.	



**EPA  
Activity 11**

**Objective:**  
**To introduce the concept of renewable versus nonrenewable natural resources.**

**Vocabulary:**      **renewable**              **nonrenewable**              **aluminum**  
                         **petroleum**              **bauxite**

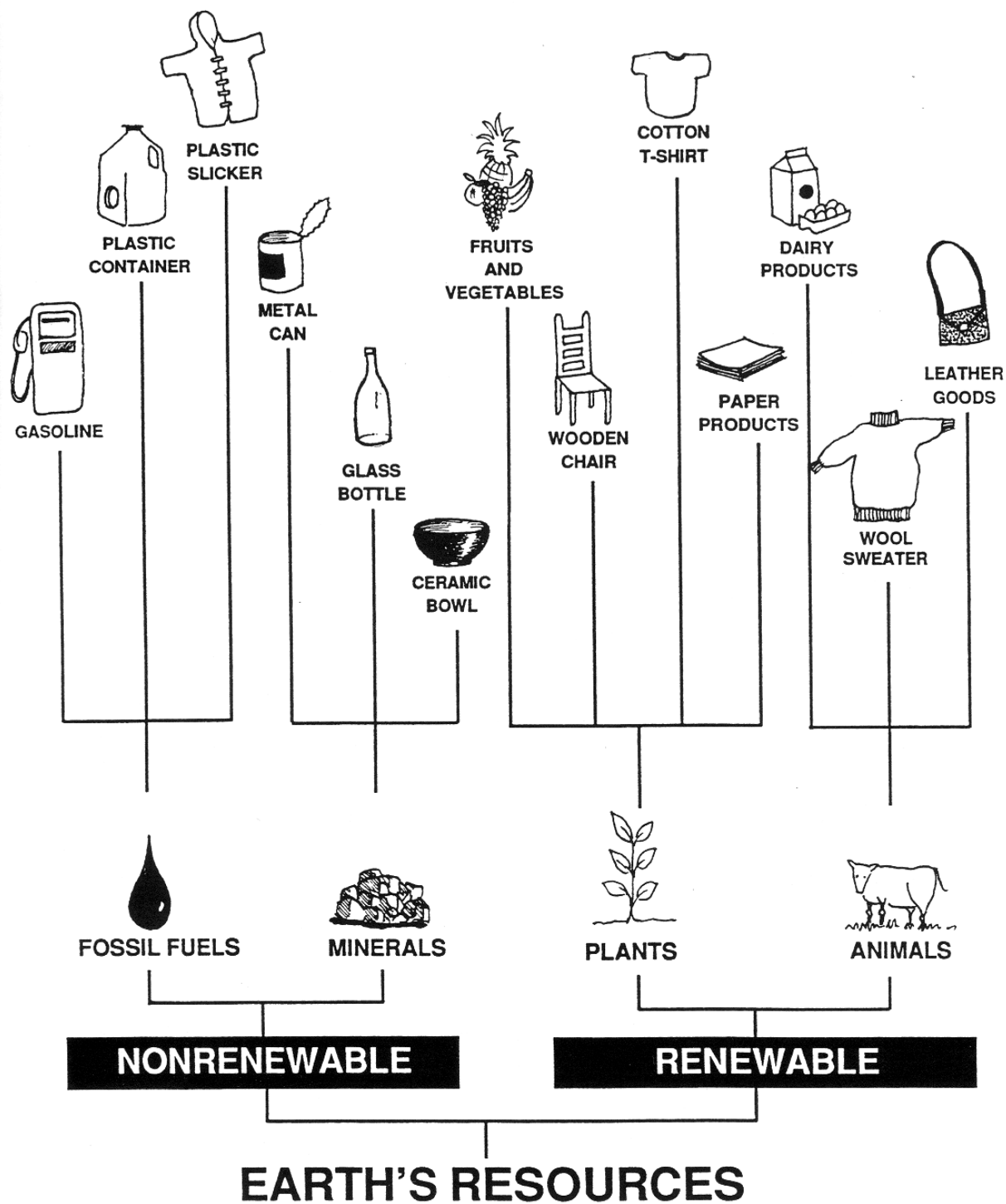
Obtain a collection of items that would normally be included in the waste stream. The collection should include examples of products from natural resources that both can and cannot be renewed (or recreated).

Reproduce the “Resource Tree” on page 47 and distribute to the class.

Using the diagram, have students identify the raw materials used to make each item and decide whether they are *renewable* or *nonrenewable*. In the discussion, point out that *aluminum*, tin, steel, and *petroleum* are all *nonrenewable resources*. Help students to understand that some materials are not renewable because they are the result of geological processes that take millions of years to complete. Nonrenewable resources are in limited supply and once they are used up, they are gone forever.

Paper and cardboard come from the *renewable* resource of wood (trees), but wood is being used at a faster rate than it can be produced commercially. At the conclusion of the discussion, students should be able to place any piece of solid waste into the categories of renewable and nonrenewable resources.

- **Aluminum cans, from *bauxite* (nonrenewable)**
- **Tin-plated steel cans, from iron and tin (nonrenewable)**
- **Glass bottles, from sand, soda ash, and limestone (nonrenewable, but in plentiful supply)**
- **Paper, from wood (renewable)**
- **Cardboard, from wood (renewable)**
- **Organic waste, such as plant clippings and food scraps (renewable)**
- **Plastic containers or bags, from *petroleum* (nonrenewable)**



# EPA Activity #11

## *MLR Alignment Summary*

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### SCIENCE & TECHNOLOGY

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
M. IMPLICATIONS OF SCIENCE AND TECHNOLOGY	<b>5-8</b> #4 Explain practices for conservation in daily life, based on a recognition that renewable and non-renewable resources have limits.	This activity teaches students the difference between renewable and non-renewable resources.	To best align, once students understand renewable vs. non-renewable, engage students in a discussion of how to conserve resources.
F. THE EARTH	<b>5-8</b> #6 Describe the many products used by humans that are derived from materials in the earth's crust.	The "Resource Tree" provides a breakdown of various products and which resources they are derived from.	





**EPA  
Activity 13**

**Objective:**  
**To give children an appreciation of waste disposal costs.**

**Vocabulary:**    **pound      ton      cost      tipping fees**

Bring in a scale and a bag of clean garbage containing an assortment of glass and plastic bottles, cans, cartons, and paper waste. Call on a volunteer to weigh the bag of garbage and then weigh him or herself. Write the two numbers on the board.

Tell children that the average person in the United States throws away over 4 *pounds* of garbage each day. Based on this statistic, ask children to answer the following questions.

**Q** How many days' worth of garbage was contained in the bag we just weighed?

**Q** How many days would it take you to throw away an amount of garbage equal to your own weight?

If each person in your community (pop. \_\_\_\_\_) throws away 4 pounds of garbage each day:

**Q** How many pounds does this equal in 1 day?

**Q** How many *tons* is this?

To help children grasp the concept of a ton (2,000 pounds), you might want to ask them how many tons some familiar objects weigh (an average 4-door compact automobile weighs about 1 ton).

Have the children try to imagine where all this refuse is being put every day of every year in every community.

You can also go further and get population statistics for your state and the entire United States, and multiply these numbers by 4 pounds. Remind children that much of this garbage is made up of resources that could be put to good use.

Tell children that it *costs* money to dispose of all of this waste. Have children imagine that it costs your community about \$30 for each ton of refuse that is disposed of in a landfill or burned in a waste combustor:

- Q** How much would waste disposal or combustion cost your community each day?
- Q** How much would it cost per year?
- Q** Where does this money come from?

To give children a better appreciation of this sum of money, ask them the price of a compact disc (CD) of a popular group. (For younger children, you might ask how much they get for an allowance or how much it costs to buy lunch at school.)

- Q** Approximately how many CDs could you buy with the money your community spends on landfill or combustion in one day? In 1 year?

You might want to have children calculate how much money could be saved if each person in the community reduced the amount he or she threw away each day by 1 pound.

# EPA Activity #13

## *MLR Alignment Summary*

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### MATHEMATICS

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
B. COMPUTATION	<b>K-2</b> #1 Use and apply estimation with quantities, measurements, computations, and problem-solving	Estimate the weight of familiar objects.	
	<b>3-4</b> #1 Solve multi-step, real life problems using the four operations with whole numbers.	Problems: How many days worth of garbage was contained in the bag we just weighed? How many days would it take you to throw away an amount of garbage equal to your own weight? etc.	
F. MEASUREMENT	<b>K-2</b> #1 Estimate and measure length, time, temperature, weight, and capacity.	Students will be weighing trash and themselves.	
	<b>3-4</b> #1 Solve and justify solutions to real-life problems involving the measurement of time, length, area, perimeter, weight, temperature, mass, capacity, and volume.	Students will be figuring the cost of waste disposal based on weight.	



**EPA  
Activity 15**

**Objective:**  
**To explore changes in lifestyle that have led to increased production of waste.**

**Vocabulary:**    **disposable**    **product**    **durable**

**Q** What do you do when your pen runs out of ink?

Most children will say they throw it away or get a new one. Explain that an item that is made to be used once or for a short period of time and then thrown away is called *disposable*.

**Q** What are some examples of disposable *products* that you have used? (diapers, pens, razors, cameras, shopping bags, wrapping paper, fast food containers, plastic eating utensils, paper plates, paper napkins, paper towels)

**Q** Why do you think people use these disposable products rather than more *durable*, or long-lasting, alternatives?

Help children to understand that people often use disposable items because it is easier, and sometimes cheaper, to replace these items than to clean, refill, or repair nondisposable products. However, although it may be more convenient to throw out paper plates, paper cups, and plastic utensils than to wash dishes, these disposables create a tremendous amount of waste.

**Q** Do you think people have always thrown away as many things as they do now? Why or why not?

Discuss with children what kinds of changes in lifestyle have caused us to create more waste in our day-to-day lives. Some examples might include:

- Buying new clothing instead of mending socks and patching worn clothing.
- Eating prepared foods or “fast foods” rather than cooking food from scratch.
- Buying individual servings or amounts convenient for storage instead of buying food in bulk quantities.
- Getting plastic or paper bags with each purchase instead of shopping with baskets or reusable bags brought from home.

- Replacing broken items rather than repairing them.

This would be a good opportunity to read the skit “Throwaway Tree,” which begins on page 54, focusing on the issue of waste production through the ages. You might also conduct this activity in conjunction with a social studies unit on how people lived at a certain period of time in history. Compare their use of resources and generation of garbage with our own. Have children work in groups to prepare skits showing the contrast between the two societies.

## THROWAWAY THREE

A short skit

By Fay Bradley

Reprinted from "Lessons from Litter" by permission of the Atlanta Clean City Commission.

"Throwaway Three" is a skit in rhyme written for three actors. To involve a larger number of students, a different person may be used for each of the ten roles.

Each part has three notations beneath it. The first is the character's date in history. Make signs for each of these dates and have one person hold up the appropriate sign at the appropriate time in the skit. The second notation is the name of the character (Monkey, Cave Dweller, etc.). The third notation describes the props. These include both the costume for the person in history and the articles thrown away.

The central idea is that as the skit progresses, each person throws more trash on the pile in the middle of the room so that a high stack is created. The skit suggests that one way to solve the problem is to recycle. A discussion of ways to solve the problem of too much garbage and trash might follow the performance.

### PROP LIST:

monkey masks

banana peel

orange peel

skins

Roman helmet

bag of trash

sack of trash

Pilgrim hat

quilt

coonskin hat

leather harness or belts

engineer's cap

three sweaters: one handmade

two machine made

lab coat

nylon stockings

plastic bags and containers

perma-pressed shirt

TV dinner

small broken appliance

toy car

Indian headband

cola bottle

clear bottle

flower

# THE THROWAWAY THREE

**Person 1** This is the tale of the Throwaway Three  
Of humans and garbage throughout his-to-ry:  
Now they're very nice people, just like you and me,  
Who all have a problem, as you will soon see --  
What shall they do with their garbage and trash?

**All:** Why, throw it! Or bury it! Or burn it to ash!

**Person 2** I represent people when we lived in a tree.  
**90,000 BC** I get rid of my garbage so easily!  
**(Monkey)** It's a snap! It's no problem---to me, or to him.  
We just let it go, plop! Down through the limbs!

**Props:** *(Monkey masks, banana peel, orange peel)*

**Person 3** I am a Cave Dweller who lives on the ground.  
**50,000 BC** What do I do with old stuff all around?  
**(Cave Dweller)** Why bury it like bones, in the muck and the mire.  
Or burn it with the leftover skins in the fire.

**Props:** *(Skins)*

**All** Yes, throw it, or bury it, or burn it to ash!  
That's how we *always* get rid of our trash!

**Person 1** I am a Roman who lives in the town.  
**200 BC** Our laws won't allow me to just throw it down.  
**(Roman)** I have to drag it away for a mile  
And then I can dump it, forget it, and smile!

**Props:** *(Roman helmet, bag of trash)*

**Person 2**  
**1200 AD**  
**(Briton)**

I am a Briton, wary and quick;  
Down on our street it can get pretty thick,  
When housewives above want to pitch out their goo,  
They just leave it out here and yell “Gardy-loo!”  
*(Person 1 stands on chair and yells “Gardy-loo!”)*  
It will stay in the alleys until the next rain,  
Or until our fair London should burn down again.

***Props:***

*(Sack of trash)*

**All**

Oh, what do we do with our garbage and trash:  
We throw it, or bury it, or burn it to ash!

**Person 3**  
**1630**  
**(Settler)**

I am the settler, I came without much,  
Oh, a rifle, an axle, a few tools and such.  
But everything else I must make with my hands.  
So I don’t throw out much –I use all I can.  
Cloth scraps become quilts; I reuse my bent nails.  
It will be a long time ‘fore the next trade ship sails.

***Props:***

*(Pilgrim hat, quilt)*

**Person 1**  
**1700**  
**(Colonist)**

I am a colonist; now life’s not so tough  
We have trade between cities that brings lots of stuff  
And some things are made by our townfolk today,  
I could buy a new harness, throw this old one away.  
We have pigs and hogs running loose in our street,  
If I toss it out there, they’ll eat it up neat!  
Or I might bury it right over there.  
Or I could burn it; no one would care.  
You see, the New World is the same as the Old!  
We trashmakers come from a time-honored mold.

***Props:***

*(Coonskin hat, leather harness or belts)*

**All**

What do we still do with garbage and trash?  
Right! Throw it or bury it or burn it to ash!



**Person 2**  
**1890**  
**(Industrialist)**

I'm the industrialist and new on the scene,  
I mass-produce goods with my trusty machine.  
This sweater, handmade, took a week, even more,  
But now in one hour, I can make forty-four.  
I make things so cheaply, you can now afford two,  
And throw out twice as much as you used to do.

**Props:**

*(Engineer's cap, three sweaters: one handmade; two machine made)*

**Person 3**  
**1950**  
**(Scientist)**

I am the scientist in the new post-war age.  
We've learned a few tricks while the war shortage raged.  
When we couldn't get natural stuff to process  
We invented synthetics to replace the rest.

**Props:**

*(Lab coat)*

**Person 2**  
**(Industrialist)**

Rayons and nylons, acrylics and plastics  
For furniture and clothing and even elastics;  
Discard your old woolens and silks and your cotton;  
Real wooden toys and washboards are forgotten.

**Props:**

*(Nylon stockings, plastic bags and containers)*

**Person 3**  
**(Scientist)**

Our new stuff will last till forever, you see  
Even when it's worn out to you and to me.  
Permanent pressed, pre-sized and pre-shrunk,  
When dingy and old, it's still permanent "junk."  
(Person 1 yells, "Junk.")

**Props:**

*(Perma-pressed shirt)*

**Person 2**  
**(Industrialist)**

We make instant menus that come in a pack.  
You just boil the food in its own plastic sack.  
Or heat our TV dinner in its tinfoil tray  
It's quick; you don't wash it; just throw it away!

**Props:** *(Plastic bag, TV dinner)*

**Person 3  
(Scientist)** We make lots of TV's and clothes dryers, too.  
Don't ask for a trade-in; you're kidding, aren't you?

**Props:** *(Small broken appliance)*

**Person 2  
(Industrialist)** Our new cars all change with each model year,  
Don't try to repair them, the cost's much too dear.  
Besides, we don't bother to make last year's parts  
For Skylarks or Novas or Cougars or Darts.

**Props:** *(Toy car)*

**Person 3  
(Scientist)** It's the New Thing, the NEW that America craves.  
So out, out with the old stuff, away to their graves.

**Person 2  
(Industrialist)** So what if there're more of us buying more goods?  
So what if they won't rot away as they should?

**Person 1  
(Indian)** Now wait just a minute! You cannot fail  
To include me in your historic trash tale.  
We Indians lived simply, on prairies, in woods,  
We made no high trash piles, nor mass-produced goods.  
Let me be your critic, show you where you stand;  
And tell you just how you're defiling our land.  
Your new-fangled goods will not rot away.  
When you throw them all down they remain where they lay  
Then you say you will bury them deep in the ground:  
All your urban trash will make quite a mound!  
So then you would burn it, in smoldering masses  
And fill up our air with smoke, deadly gases!  
Oh, all of your answers have faults everywhere:  
You'll ruin the water, the land or the air.  
What's more your resources --- your lumber, your ore --

Get smaller each year than the year just before.  
And what's more --- this old earth's not making any more.

**Props:** *(Indian headband)*

**Person 2  
(Industrialist)**

You're right. Our resources are shrinking away  
While our garbage problem grows bigger each day.  
We're always converting resources to refuse  
Instead of recycling them all for reuse!

*(Throw out cola bottle)*

**Props:** *(Cola bottle)*

**Person 3  
(Scientist)**

Oh stop it! Don't drop it! We'll think of a way  
To make food for cows that's much better than hay.  
Don't burn it, return --- we'll make something new,  
A vase for your mother, a spyglass for you.  
Don't bury it, carry it --- back to the mill.  
We'll make a new blanket to ward off the chill.

*(Pick up old quilt and wrap around shoulders.)*

**Props:** *(Clear bottle, flower)*  
*(Flower in bottle for vase, flower out, bottle*  
*held up to eye for spyglass)*

**Person 2  
(Industrialist)**

It's time to progress past the Disposal Age  
And make recycling the popular rage!  
We'll have to give up old solutions for trash  
And all realize that its pure balderdash --- to just

**All** Throw it, or bury it, or burn it to ash!

**END**

# EPA Activity #15

## *MLR Alignment Summary*

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### SOCIAL STUDIES

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
HISTORY B. HISTORICAL KNOWLEDGE, CONCEPTS, AND PATTERNS	<b>K-2</b> #1 Demonstrate an understanding of the similarities between families now and in the past, including daily life today and in other times.	Discussion Q: Do you think people have always thrown away as many things as they do now? Why or why not?	Will better align if conducted in conjunction with the “Throwaway Tree” skit.
HISTORY C. HISTORICAL INQUIRY, ANALYSIS, AND INTERPRETATION	<b>3-4</b> #1 Identify changes currently occurring in their daily lives and compare these to changes in daily life during a specific historic era.	Discussion Q: Do you think people have always thrown away as many things as they do now? Why or why not?	Will better align if conducted in conjunction with the “Throwaway Tree” skit.



**EPA  
Activity 22**

**Objective:**  
**To introduce children to the concept of natural cycles.**

**Vocabulary:**    **organism**    **natural cycle**    **compost**

Collect dead leaves in several stages of breakdown or take a field trip to a wooded area to show children what happens to leaves after they fall.

**Q** Do you know what becomes of all the leaves that are on the ground in the fall?

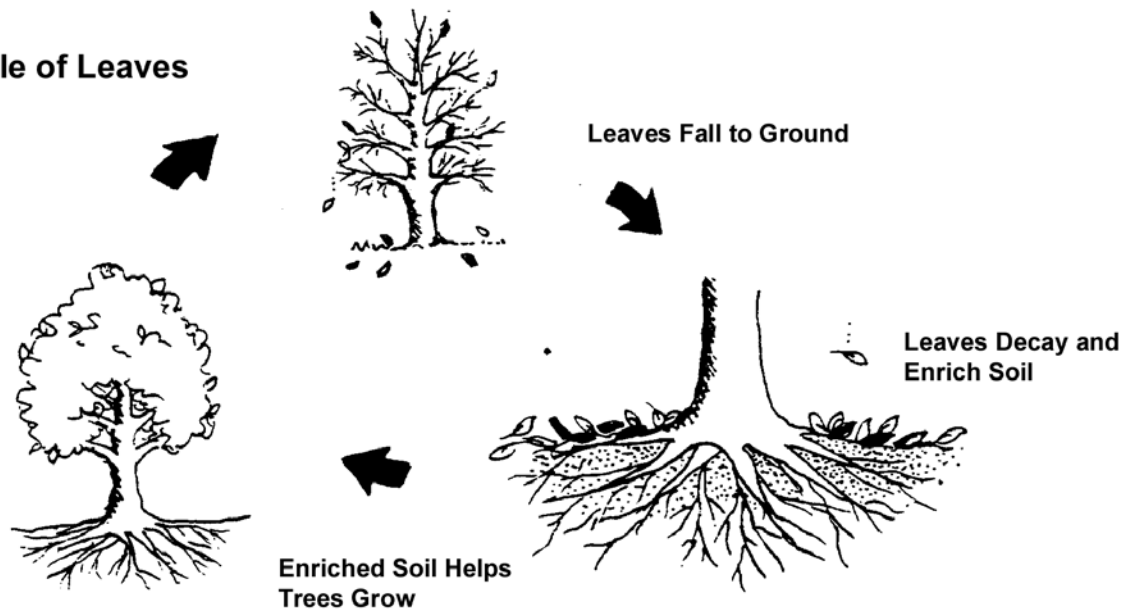
**Q** Where do they go next summer?

Make the connection that leaves become soil by letting the children see and feel the layers of leaf and soil that you collected. Have children make sketches and take notes on what they observe. Explain to children that, along with molds, other tiny *organisms* break leaves down into soil.

Help children to understand that a tree's leaves fall, decay into the soil, nourish the tree by making the soil richer, and thus help the tree to grow and produce more leaves. Tell them that a series of events in nature that repeat over and over is called a *natural cycle*.

Using their sketches, have children make a large art mural showing all the stages in the cycle of leaves. (You may wish to refer to the illustration below.)

## Cycle of Leaves



Another way to illustrate the leaf cycle for younger children would be to print the following words on 3 x 5 cards: *soil*, *roots*, *trunk*, *branch buds*, *green leaves*, *dead leaves*. Distribute the seven cards to seven children at random. After each child has shown his or her card to the class, give a long piece of string to the child holding the card marked “soil.” Ask the children to arrange themselves in order according to stages of growth and decay. As each determines his or her corresponding position, he or she should take hold of the string. They should end up in a circle.

Explain to children that some households and communities put their food and yard waste in outdoor piles called *compost* piles. These materials will also decompose into the soil, and can then be used as compost to enrich soil for gardening or other planting. Recall for children the statistic in Activity 14: *We throw away 31.6 million tons of yard waste a year*. Composting helps reduce the amount of waste that must be landfilled or combusted. Tell children that composting is a form of *recycling*, which they will learn more about in the next activity.

## **EPA Activity #22**

### *MLR Alignment Summary*

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#### **SCIENCE AND TECHNOLOGY**

<b>Standard</b>	<b>Performance Indicator</b>	<b>Evidence of Alignment</b>	<b>Notes for Adaptation</b>
F. THE EARTH	<b>3-4</b> #1 Demonstrate an understanding that many things about the earth occur in cycles that vary in length and frequency.	Leaf cycle as an example of a “natural cycle”	



EPA  
Activity 26

### Objective:

To review solid waste problems and learn how glass, paper, plastic, used oil, aluminum, yard waste, and tin-plated steel cans are recycled.

**Vocabulary:**    **cullet**    **ore**    **caustic**    **pulp**  
                     **fibers**    **electrolysis**    **ingots**

Discuss the sequence of steps in recycling the following materials.

**Glass** is made from soda ash, sand, and lime. It can remain in a disposal site indefinitely and does not break down into its organic components. To be recycled, it must first be sorted by color and crushed into small pieces called *cullet*. The cullet is melted down into a liquid and then molded into glass containers. Other products made from recycled glass bottles are insulations and road-construction materials.

**Aluminum** is made from *bauxite*, and *ore* that must be mined from the ground. It takes a great amount of electricity to produce aluminum. Nature cannot decompose or break it down, so disposal is a problem. When recycled, aluminum is melted and then shaped again into new cans and other items. Making aluminum cans from old aluminum takes only 5% as much electricity as making cans from bauxite.

**Tin-plated steel cans** are made of iron ore and tin, both nonrenewable resources. The cans will eventually rust and break down, but throwing them away is a waste of valuable metals. In the recycling process, the cans are put into a huge container with holes in the bottom. The container is immersed in a *caustic* solution which dissolves the tin from off the cans. Then the steel cans are washed and sold as high grade steel. The dissolved tin is then removed from the caustic solution by *electrolysis* and made into *ingots* which are then sold to companies requiring tin.

**Paper** is made from trees. Paper is recycled by first shredding it into small pieces and mixing it with water. This mixture is beaten into a mush-like *pulp* which flows onto a moving screen through which most of the water passes. The wood or paper *fibers* remain. The fibers are pressed through heavy rollers that remove more water and then sent through steam-heated dryers. The result is recycled paper. You can make recycled paper in class.

**Plastic** is made of petroleum. It can be recycled either as a mixture of different kinds of plastic or as a single type. Separating plastic by type enables manufacturers to produce higher quality recycled products, or those closer to what could be produced from virgin materials. Polyethylene terephthalate (PET) (soft drink containers) and high density polyethylene (HDPE) (milk



containers) are the plastics most commonly used in beverage containers and the types most easily separated. In the recycling process, plastics are melted down and reshaped into the recycled products. Some of the common uses for recycled PET are fiber, structural molding, and containers. HDPE can be recycled into bottles, toys, pipes, crates, and a variety of other products. Products of mixed batch plastic recycling include garbage pails, car stops, manhole covers, park benches, plastic “lumber,” and railroad ties.

**Used motor oil** collected from people who change their own oil (do-it-yourselfers) can be recycled safely and effectively. It can either be cleaned and used as fuel to be burned in asphalt plants or cement kilns, or it can be rerefined and used again as motor oil. The process of rerefining used motor oil is much cheaper and easier than processing virgin oil.

**Yard waste**, such as grass, leaves, shrubs, and tree clippings, can be collected and composted by individual households or on a community-wide level. The composting process is described in Activity 24. The compost product from large-scale processing can be distributed to the community as fertilizer for landscaping, gardens, or agricultural uses.

In this activity, students research the “life cycle” of a particular type of waste. Break students into groups and assign one of the types of waste listed below to each group. Reproduce and give each student the questionnaire on the following page to help them tell about their particular resource.

- **Aluminum Can**
- **Plastic Tube**
- **Cardboard Box**
- **Tin Can**
- **Glass Bottle**

Have the groups present their findings to the class. They should make use of drawings, models or other visual aids and try to make the presentation as informative and entertaining as possible. Older students may wish to make a film or videotape showing the life cycle of their chosen object. These films could be shown to the class or combined in a presentation to the entire school.

## THE STORY OF THE

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1. What does it look like?
2. Why does it have a label?
3. What are some of the things it is used for?
4. What is it made of?
5. Where does the manufacturer get the raw materials to make it?
6. Are there large amounts of these raw materials available?
7. How many years will it be before these raw materials run out?
8. Does the process of extracting these raw materials from the earth pollute the land, the air, or the water? If so, how?
9. How do manufacturers change the raw materials to make the product?
10. Does the changing of the raw materials pollute the land, the air, or the water? If so, how?
11. Is the item thrown away after it is used?
12. What effect would this item have if it was littered on the ground or in a body of water?
13. What chemicals are released when it is burned? Are they harmful if released into the environment? Can they be filtered and disposed of properly?
14. Does the item break down into earth again if it is buried? If so, how?
15. Does it disintegrate if thrown into a river, lake, or ocean? If so, how?
16. What are some ways in which it could be reused?
17. Can it be recycled? Is it currently recycled? Where?
18. How is it recycled?
19. Can it be safely burned to produce energy from heat?
20. Who pays the real cost for manufacturing this item?
  - a. The manufacturer who makes it?
  - b. The company that uses it?
  - c. The consumer who buys it?
21. Who is responsible for disposing of it? Who pays the cost for disposal?
22. Do you think this item makes a good container? Why or why not?
23. Could we have avoided using this container? How?

# EPA Activity #26

## *MLR Alignment Summary*

### SCIENCE & TECHNOLOGY

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
F. THE EARTH	<b>5-8</b> #6 Describe the many products used by humans that are derived from materials in the earth's crust.	The Story of ____ Questions #1-6.	
M. IMPLICATIONS OF SCIENCE AND TECHNOLOGY	<b>5-8</b> #1 Research and evaluate the social and environmental impacts of scientific and technological developments.  #7 Explain the connections between industry, natural resources, population, and economic development.	Questions #8-21.  Questions #5-8, 20-21.	To best align, students could research what part of the world the material comes from, who is responsible for the labor, and how it affects the local economy.

### ENGLISH LANGUAGE ARTS

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
H. RESEARCH RELATED WRITING & SPEAKING	<b>5-8</b> #1 Collect and synthesize data for research topics from interviews and field work, using notetaking and other appropriate strategies.  #6 Use magazines, newspapers, dictionaries, journals, and other print sources to gather information for research topics.  #7 Use search engines and other Internet resources to collect information for research topics.	Students must use a variety of research techniques to complete The Story of _____.  “ “  “ “	Students may want to interview the local recycling coordinator to get information about what happens to specific materials recycled in your town.



**EPA  
Activity 32**

**Objective:**  
**To involve students in the waste management decision-making process.**

Explain to students that decisions about waste management are complex because people have different perspectives on the same problem. Everyone, however, has the opportunity to present his or her viewpoint before a decision is made.

Tell students that they are going to consider an imaginary situation in which a county must decide to change its method of waste management. Hand out the fact sheet on page 70 that presents three different waste management options. Allow time for students to read and study it. You may want to have them work in small groups to come up with their list of specific issues and concerns. When students have finished, hold the following discussion.

**Q** What different groups in the community would be affected by the decision?

Elicit from students the following categories of community members (and/or others) and write them on the board:

**Farmington Residents**

**Busy City Residents**

**County Real Estate Developers**

**Environmental Activists**

**City Merchants**

**Manufacturers**

**City Political Leaders**

**Waste Haulers**

Discuss with students the concerns of each of these groups and encourage them to hypothesize what option members of each group might favor. Be sure to include in your discussion such factors as:

1. **Proximity.** People who live close to a proposed site may have concerns about noise, odor, pollution, traffic, or spoiling of landscape that a facility may cause. Residents or land owners who may lose their properties to the construction of a new facility will be particularly upset.
2. **Economic Impact.** Developers may be concerned that property that they are considering building on will decrease in value because of the facility. Merchants may worry that the nearness of a facility will make an area less attractive to tourists and people who come from neighboring towns to shop. Manufacturers will be interested in ensuring that they can continue to dispose of their waste in the most cost-effective manner possible. To a lesser degree, all County residents will also be affected by rising costs of waste disposal.
3. **Social/Environmental Issues.** Environmental groups will be concerned about the effects of facilities on the surrounding environment, including the loss of parkland or open spaces for wildlife. Community members may also worry about the County's image and desirability, as well as the potential industrial growth that could follow the construction of a major waste management facility. There may also be widespread concern about perceived sanitation problems at a landfill or air pollution resulting from a combustor.
4. **Legal and Political Concerns.** Different government agencies will have a variety of concerns, depending upon their areas of responsibility. For example, one agency may have concerns about air quality, another about health, still another about trade and commerce in the County. There are also guidelines to consider in the construction of facilities, and varying costs involved in building and regulating them. Political decision-makers need to balance the needs and desires of all the groups in the community in order to ensure public support.

Be sure you introduce into the discussion the idea of long-term versus short-term solutions to the waste problem.

When you feel the issues have been covered satisfactorily, ask students to write down the option that they would choose, along with a paragraph defending their choice. Then call on volunteers to present their arguments to the class. Allow for the possibility that some students may try to modify the original options by proposing a combination of management techniques, including source reduction or recycling.

# FACT SHEET

## Background Information

Approximately 25,000 people live in Pleasant County: 10,000 live in Busy City, 1,200 live in Farmingtown, and 1,300 live outside in surrounding residential and rural areas. The County has always hauled its trash to nearby Fillup County, but the landfill has reached its capacity and is scheduled to close later this year. Pleasant County, therefore, needs to find an alternative for managing its waste. Various proposals for solutions to the problem are presented below:

1. Pleasant County could construct a major sanitary landfill on farmland adjacent to Farmingtown. This land would need to be purchased from local growers with federal grant money and would probably take care of the County's waste for the next 40 or 50 years. This is the least expensive option to County residents.
2. The County could construct a waste-to-energy combustion plant just outside of Busy City limits. The property to be purchased includes part of a public park that is used for recreation by the city residents. The combustion plant would be more expensive than the landfill but would continue to take care of a majority of the County's trash for the indefinite future. Some of this money would come from a federal grant; the rest would come from increased garbage collection costs. It would also require the exploration of markets for recyclables that could not be burned efficiently or safely. In addition, some additional costs would be necessary to cover hauling of ash to a landfill in Faraway State. This is the second least expensive option.
3. The County could raise garbage collection fees considerably and haul all of its waste to Faraway State. This option could also include a provision that County residents would pay by weight for the amount of garbage they had hauled away each week. Faraway State's landfill has enough capacity to receive Pleasant County's garbage for another 10 to 15 years. This would be the most expensive option for users of the waste hauling service.

A variety of groups in the community—residents, developers, politicians, merchants, people in business and industry, environmental organizations, health organizations, farmers, waste haulers, construction engineers—all have particular concerns that they would like to see addressed by decision-makers. Considering what you have learned about waste management and what you know from your own experience, write down as many of these concerns as you can.

# EPA Activity #32

## *MLR Alignment Summary*

### SOCIAL STUDIES

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
CIVICS & GOVERNMENT A. RIGHTS, RESPONSIBILITIES, AND PARTICIPATION	<b>5-8</b> #4 Identify ways in which citizens in a pluralistic society manage differences of opinion on public policy issues.	Group discussion regarding concerns of citizens, government, special interest groups...	
	<b>Secondary</b> #1 Develop and defend a position on a public policy issue within our democracy.	Written paragraph defending individual choice.	
CIVICS & GOVERNMENT B. PURPOSE AND TYPES OF GOVERNMENT	<b>5-8</b> #3 Contrast the roles of local, state, and national governments by investigating, evaluating, and debating a current civic issue.	Group discussion regarding legal and political concerns, as well as social/environmental issues, etc.	To best align, students could do Maine-specific research on siting of landfills or incinerators, and government & media involvement in the process.
	<b>Secondary</b> #2 Assess the different jurisdictions and roles of local, state, and federal governments in relation to an important public policy issue.  #5 Evaluate the role of the media and public opinion in United States politics, including ways the government and media influence public opinion.	Group discussion regarding legal and political concerns, as well as social/environmental issues, etc.  “ “	To best align, students could do Maine-specific research on siting of landfills or incinerators, and government & media involvement in the process
ECONOMICS B. ECONOMIC SYSTEMS OF THE UNITED STATES	<b>5-8</b> #3 Identify how the fundamental characteristics of the United States economic system (e.g., private property, profits, competition, and price system) influence economic decision making.	<b>Economic Impact</b> discussion will cover these issues.	

	<b>Secondary</b> #4 Describe the full costs (including externalities) associated with the use of natural and human resources to produce economic goods and services (e.g., solar power versus nuclear power to provide electricity.)	<b>Economic Impact</b> discussion will cover these issues.	
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## ENGLISH LANGUAGE ARTS

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
G. STYLISTIC AND RHETORICAL ASPECTS OF WRITING AND SPEAKING	<b>5-8</b> #6 Write and deliver oral presentations that achieve distinct purposes (e.g., to summarize, to narrate, to inform, to explain).	Written paragraph defending individual choice. Volunteers will present these paragraphs to the class	
	<b>Secondary</b> #5 Write pieces and deliver oral presentations that achieve distinct purposes (e.g., to persuade, evaluate, analyze, defend).	Written paragraph defending individual choice. Volunteers will present these paragraphs to the class	





**EPA  
Activity 33**

**Objective:**  
**To determine the availability of products made from recycled materials in the marketplace.**

**Vocabulary:    consumer demand**

Have students make a survey of products in a supermarket or department store that are made from recycled materials. Tell them to look for the recycling symbol on boxes and other containers. Review the symbol with them if necessary.

Discuss the results of their survey. Then have students research why there aren't more recycled materials in the marketplace.

**Q** Are there any reasons that consumers or manufacturers may prefer to use new materials instead of recycled ones? (The technology may be expensive, there may be some limitations in the strength or appearance of some recycled materials; there may be a lack of a stable supply of materials.)

**Q** Is there anything we can do to get more recycled products on the market?

Explain that the more we recycle and request products made from recycled materials, the more recycled materials will begin to appear. The key to success in recycling is *consumer demand*. Emphasize that consumers need to use their buying power to choose products made from recycled materials. The more consumer demand there is for products made from recycled materials, the more industry will need to respond to that demand. Suggest to students that they request stores where they shop to carry more products made from recycled materials.

**Q** Are people willing to buy products made from recycled materials if they are competitive in price and quality?

**Q** Why do we all need to buy as many products made from recycle materials as possible whenever they are available?

# EPA Activity #33

## *MLR Alignment Summary*

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### SOCIAL STUDIES

Standard	Performance Indicator	Evidence of Alignment	Notes for Adaptation
ECONOMICS A. PERSONAL AND CONSUMER ECONOMICS	<b>5-8</b> #1 Analyze how scarcity affects individuals' decisions about production and consumption of goods and services.  #2 Identify and analyze the factors that contribute to personal spending and savings decisions.	Discussion Q: Are there any reasons that consumers or manufacturers may prefer to use new materials instead of recycled ones? (for both indicators)  Discussion Q: Are people willing to buy products made from recycled materials if they are competitive in price and quality?	
ECONOMICS B. ECONOMIC SYSTEMS OF THE UNITED STATES	<b>5-8</b> #1 Demonstrate knowledge of economic concepts of supply, demand, price, the role of money, and profit and loss.  #2 Analyze how prices act as signals to producers and customers to answer the three basic economic questions: What to produce? How? And for whom?	Discussion Q: Why do we all need to buy as many products made from recycled materials as possible whenever they are available?  Discussion Q: Are there any reasons that consumers or manufacturers may prefer to use new materials instead of recycled ones? Is there anything we can do to get more recycled products on the market?	
	<b>Secondary</b> #1 Describe the factors (i.e., physical, capital, technology, monetary resources) that impact the development and the distribution of a product.	Discussion Q: Are there any reasons that consumers or manufacturers may prefer to use new materials instead of recycled ones?	

## **The E Project**

**Subject/Topic Areas:** Science, Math, Language Arts, Social Studies

**Grade Level:** 7

**Time Frame:** 5 weeks

**Key Words:** Environment, pollution, endangered, threatened, population, resources

### **Summary:**

The E Project is an interdisciplinary unit designed to get students involved in making a difference in the world around them. Real world environmental problems will be researched and reported on. Students will be required to report on their findings to the class and analyze what should be done to remedy the present situation and prevent future environmental problems from occurring.

Environmental issues and problems have been introduced as part of the Ecology unit covered in Science class. For more in-depth study, students are asked to select an environmental research topic, using a list provided to help in the selection. Students spend class time and other time in the library researching their topic using the Internet as the primary source of information gathering. Once the problem has been thoroughly researched, a report is produced and the findings are reported out to the class.

Up to now, this project sounds like any other, but here is the difference. Since this unit is about environmental issues, the unit itself is designed to involve each student directly in being part of the solution and not part of the problem. This entire project is designed to be as environmentally responsible as possible. All students will be practicing environmental responsibility first hand. The main difference in the E Project is the products students will be required to produce.

**1. The E Paper:** The E Paper is a research paper that makes a difference. All work will be done using as little paper as possible. All work, including the rough draft and final paper, will be written, saved and graded on the computer. Research information is used and saved on a file server system used at school. Each student has a folder in which to keep all their findings and work. Teachers will grade the rough drafts and the final E Papers using the same file server system. The result is that little or no paper is used for the entire project. Each student will be asked to estimate how much paper they saved by doing their work electronically from start to finished product. A final estimate of paper saved will be tabulated upon project completion. The E Paper will be done as part of Language Arts and Social Studies.

**2. The Presentation:** Students will present their findings to the class to demonstrate their understanding of their specific environmental issue. Students will be required to introduce the problem, discuss the causes and effects, explain possible solutions, explain what they feel needs to be done and what will happen if no further action is taken.

Students are to create a multimedia presentation using Hyperstudio Multimedia Presentation Program as a visual aid for their presentation. Students will gather pictures, film clips, music, graphs, and charts from the Internet and other sources and use the computer

generated presentation program to create a multimedia presentation to be used during their oral presentation to the class. Since the visual aid is digital, no poster board or paper is used for this portion of the E project. The Presentation will be done as part of Science.

**3. The Model:** The model is a visual that each student is required to create that will show the results of their research and their findings. The model, like a science fair type model has one additional requirement. It must be made entirely of recycled materials. Again, no new resources are used for this portion of the project. The model will be done as part of Math.

**4. Graphs:** Students are also required to create 2 appropriate graphs to demonstrate their ability to analyze data. Students are required to create graphs that present data on their topic visually. Students can choose to create the graphs on recycled paper or create digital graphs and use them during their Hyperstudio presentation. The graphs will be done as part of Math.

**In addition to the products,** the unit is enriched with guest speakers that address specific environmental issues that their organizations are working on. The students hear first hand that environmental issues are real and are problems that companies and organizations are working on trying to solve today. They also learn that their involvement can and does make a difference. Students also hear about career opportunities in the environmental field.

**The E Project finale is a mini Earth Day.** During Earth Day, students spend part of the day participating in a school clean up/fix up morning. Students work on the school campus doing their part in making their school environment a better place. A cookout using reusable trays, utensils, and recycled napkins will reemphasize the theme of the E Project: to reduce, reuse and recycle. During the cookout, a final tabulation of paper and poster board saved will be announced.

All correspondence from teacher to student (project and product descriptors, assessment lists, etc.) is printed on salvaged and reused paper.

From start to finish, students participating in this project will learn first hand how resource consumption can be reduced and how their actions can make a difference. Students learn that awareness of environmental issues is indeed important, and even more important is active participation in becoming part of the solution.

# The E Project

## Stage 1: Identifying desired results

*What overarching understandings are desired?*

Environmental issues are by far the biggest problem facing humankind today. It is important to learn how human activity affects the environment and how we as individuals in society can make a positive impact by becoming informed and involved.

*What will students understand as a result of this unit?*

Every person in society directly impacts the environment with our daily activities. Becoming informed and aware can help an individual make more appropriate decisions to lessen that impact. Becoming directly involved in solving environmental problems is important for all of us.

*What are the overarching, essential questions?*

How does human activity directly impact the environment?

How can making more informed decisions in regards to the environment lessen that impact?

*What questions will guide this unit?*

How does human activity affect our earth?

How can we as individuals make a positive difference on environmental issues?

*What key knowledge and skills will students acquire as a result of this unit?*

- Learn about the impacts humans have on the environment
- The types of environmental problems that face us today
- The causes of environmental problems
- The effects these environmental problems have on us
- The solutions to environmental problems proposed today
- What else should be done to solve environmental problems
- Conservation, renewable, and nonrenewable resources
- Becoming more aware of environmental problems
- Becoming an active member of the community
- Natural resources and human dependence on these resources
- Global ecosystems and their unique characteristics
- Endangered and threatened species of the world
- Research skills
- Writing a research paper
- Making an oral presentation
- Creating a multimedia presentation

## **Stage 2: Determining Acceptable Evidence**

*What evidence will show that students understand:*

Every person in society directly impacts the environment with our daily activities. Becoming informed and aware can help an individual make more appropriate decisions to lessen that impact. Becoming directly involved in solving environmental problems is important for all of us.

### *Performance Tasks and Projects*

Students will select a specific environmental issue and research the topic extensively. Students will synthesize a research paper covering their specific topic, including causes, effects, solutions, and personal reactions. Students will prepare for and present an oral class presentation of their research topic. Students will create a multimedia presentation to be used as a visual aid during their oral presentation. Students will also create 2 graphs and a model to help demonstrate their understanding of the environmental problem that they researched.

### *Assessment*

The following products will be graded: research paper, oral presentation, multimedia presentation, graphs, and model.

Research Paper: Language Arts and Social Studies

Oral Presentation & Multimedia Presentation: Science

Graphs and Model: Math

### *Student Self Assessment*

Students will be encouraged to peer edit all work and do a self-evaluation of each product.

## **Stage 3: Plan Learning Experiences and Instruction**

*What sequence of teaching and learning experiences will equip students to develop and demonstrate the targeted understandings?*

See attached descriptors, criteria sheets and evaluation sheets.

1. Many environmental issues discussed in Science class as part of an Ecology unit
2. Topics were selected and researched
3. The E Paper created, rough draft and final copy completed
4. Hyperstudio Multimedia Presentation created
5. Graphs and Model completed
6. Oral presentation to classmates

Students will hear from guest speakers addressing students on the environmental issues their organizations are currently working on.

The culminating activity is a Mini Earth Day. Students will participate in a school clean up/fix up morning session, a guest speaker addressing the group, followed by an environmentally responsible cookout and an afternoon session of activities and fun. An announcement will be made at this time as to how much paper and paperboard was saved by making this project an E Project.

## **Guiding Principles**

The E Project directly impacts the following Guiding Principles.

Each Maine student must leave school as:

- 1) Clear and Effective Communicator
  - a) Uses oral, written, visual, artistic and technological modes of expression
  - b) Reads, listens to and interprets messages from multiple sources
- 2) A Self-Directed and Life-Long Learner
  - b) Demonstrates the capacity to undertake independent study; and
  - c) Finds and uses information from libraries, electronic data bases and other resources
- 3) A Creative and Practical Problem Solver
  - a) Observes situations objectively to clearly and accurately define problems;
  - b) Frames questions and designs data collection and analysis strategies from all disciplines to answer those questions;
  - c) Identifies patterns, trends, and relationships that apply to solutions to problems; and
  - d) Generates a variety of solutions, builds a case for the best response, and critically evaluates its effectiveness of this response.
- 4) A Responsible and Involved Citizen
  - a) Recognizes the power of personal participation to affect the community and demonstrates participation skills;
  - b) Understands the importance of accepting responsibility for personal decisions and actions;
  - c) Knows the meaning of achieving personal and community health and well being; and
  - d) Recognizes and understands the diverse nature of society.
- 6) An Integrative and Informed Thinker
  - a) Applies knowledge and skills in and across English language arts, ..., health, ..., mathematics, science, social studies, ...; and
  - b) Comprehends relationships among different modes of thought and methods associated with the traditional disciplines.

## **Content Areas, Standards and Performance Indicators**

### **Science and Technology: Middle Grades 5-8**

#### **A) Classifying Life Forms**

- 1) Describe some structural and behavioral adaptations that allow organisms to survive in a changing environment.

#### **B) Ecology**

- 2) Analyze how the finite resources in an ecosystem limit the types and populations of organisms within it.
- 3) Describe succession and other ways that ecosystems can change over time.
- 4) Generate examples of the variety of ways that organisms interact (e.g., competition, predator/prey, parasitism/mutualism).

#### **D) Continuity and Change**

- 2) Explain how scientists use fossils to prove that life forms, climate, environment, and geological features in a certain location are not the same now as they were in the past.
- 3) Provide examples of the concept of natural and artificial selection and its role in species changes over time.

#### **F) The Earth**

- 4) Describe factors that can cause short-term and long-term changes to the earth.
- 6) Describe many products used by humans that are derived from materials in the earth's crust.
- 7) Demonstrate factors effecting the flow of groundwater.

#### **H) Energy**

- 1) Analyze the benefits and drawbacks of energy conversions (e.g., in electricity generation).
- 5) Categorize energy sources as renewable or nonrenewable and compare how these sources are used by humans.

#### **L) Communication**

- 1) Discuss scientific and technological ideas and make conjectures and convincing arguments
- 2) Defend problem-solving strategies and solutions.
- 3) Evaluate individual and group communication for clarity, and work to improve communication.
- 4) Make and use scale drawings, maps, and three-dimensional models to represent real objects, find locations, and describe relationships
- 5) Access information at remote sites using telecommunications.
- 6) Identify and perform roles as necessary to accomplish group tasks.

#### **M) Implications of Science and Technology**



- 1) Research and evaluate the social and environmental impacts of scientific and technological developments.
- 2) Describe the historical and cultural conditions at the time of an invention or discovery, and analyze the societal impacts of that invention.
- 3) Describe the ethical issues surrounding a specific scientific or technological development.
- 4) Describe an individual's biological and other impacts on an environmental system.
- 5) Identify factors that have caused some countries to become leaders in science and technology.
- 6) Give examples of actions which may have expected or unexpected consequences that may be positive, negative, or both.

Explain the connections between industry, natural resources, population, and economic development.